FLORA OF THE GUIANAS

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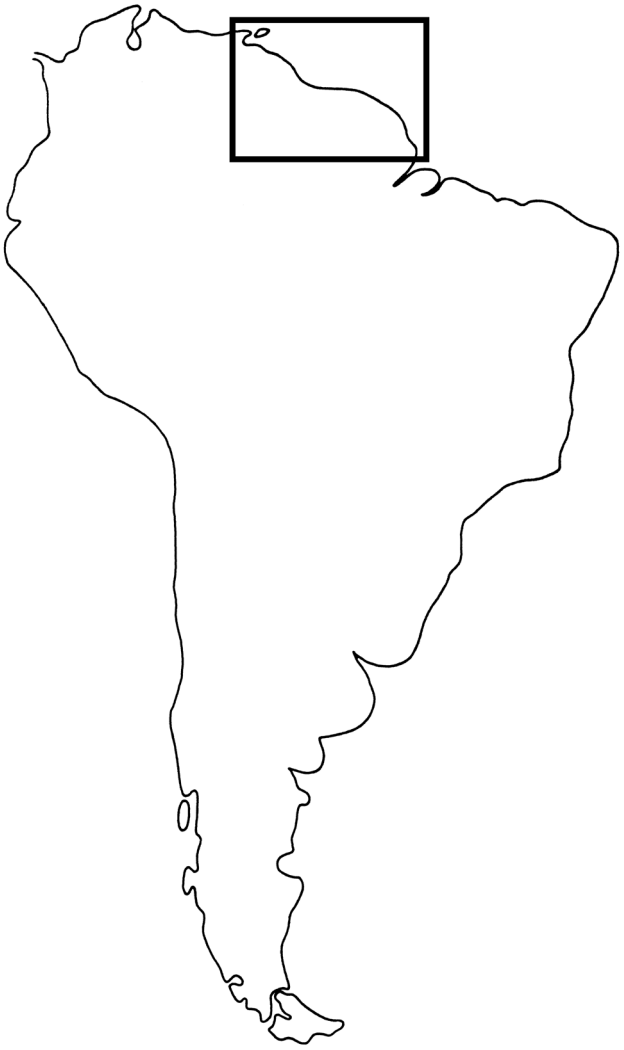

Leiden, October 2012

The Flora of the Guianas is a co-operative programme of: Botanischer Garten und Botanisches Museum Berlin-Dahlem, *Berlin*; Institut de Recherche pour le Développement, IRD, Centre de Cayenne, *Cayenne*; Department of Biology, University of Guyana, *Georgetown*; Herbarium, Royal Botanic Gardens, *Kew*; New York Botanical Garden, *New York*; Nationaal Herbarium Suriname, *Paramaribo*; Muséum National d'Histoire Naturelle, *Paris*; Nationaal Herbarium Nederland, Utrecht University branch, *Utrecht*, and Department of Botany, Smithsonian Institution, *Washington, D.C.*

For further information see the website:

http://www.nationaalherbarium.nl/FoGWebsite/index.html

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In Memorian

Marie-Françoise Prévost (1941-2013), known by most of her friends and colleagues as "Fanchon" passed away on January 31st, 2013, at the Hospital in Cayenne. Two days before, she suffered a stroke while working at the Cayenne Herbarium (CAY), and was identifying plant specimens until shortly before. Fanchon retired in 2006, after many years working at the IRD (ex ORSTOM), first in Ivory Coast, then in French Guiana since the late 1970s. An outstanding botanist, she was appreciated and esteemed by many specialists of the Neotropical flora, especially those working on the Flora of the Guianas. She favored informal relations with her expert colleagues and often provided invaluable help by sharing precious information and identifying numerous specimens. As a token of appreciation of the role she played, several plant species have been named after her, and one of the 21 architectural growth models of tropical trees described by Hallé and Oldeman in 1970 bears her name. Her successful career greatly benefited from her sharp mind and keen sense of observation which she devoted to the study of tropical vegetation, which she generously shared with her colleagues and the students she helped to train. She diligently avoided honors and any kind of formal ceremonies throughout her professional life. Passionate in her work, tireless in the field and the herbarium alike, she played a major role in many research domains. In forest ecology, she initiated with Sabatier the program of work currently developed at AMAP Research Unit on tree diversity in French Guiana. She contributed greatly to medicinal plant studies, as it is testified by her involvement in the latest edition of the book "Pharmacopées traditionnelles en Guyane" published in 2004. During the last years, her age started to take its toll and she rarely went to the field, but, after retiring, she remained very active and worked intensively at the Cayenne herbarium, until her last days.

Jeanne Florschütz (1924-2012) has started working with Bryophytes together with her husband, Peter Florschutz, in the Utrecht Herbarium , Netherlands, for the Flora of Suriname. At that time, only a few moss collections existed from the Guianas. When Peter Florschütz suddenly died in 1976, Jeanne continued the work, preparing the second Bryophyte fascicle in the Flora of Suriname. In 1996, Jeanne published in the Flora of the Guianas, Series C, Musci III (Leucomiaceae, Thuidiaceae, Sematophyllaceae and Hypnaceae), but the work was not yet finished. Jeanne continued to collect mosses in the Guianas in the 1980s and 1990s, which resulted in 83 extra species and 4 varieties for the Guianas. Decades of dedication and a great knowledge in moss taxonomy resulted in the recent completion of the Moss Flora of the Guianas. The publication of this exhaustive and careful work, as Flora of the Guianas, series C, 2 Musci, was celebrated in the Botanical Garden in Utrecht (see picture), a few months before Jeanne left us.

1. MEETING PROGRAM

22/Oct.: NATIONAAL HERBARIUM NEDERLAND, EINSTEINWEG 2. ROOM F 108.

9:00 Ongoing floras and modern classifications: How should we organize our families?
By Piero Delprete – IRD, Herbier de Guyane (CAY) - Open to the public

10:00 Board members meeting. Agenda:
- Report on previous meeting in Washington; board personnel changes
- Memorandum of Understanding
- Report from the editorial office (new fascicles, new contacts, funding)
- Report from the institutes
- Next meeting, other business

11:00 Classification system: an update?

13:00 Lunch

14:00 General meeting. Agenda:
- Board meeting resolutions
- Suggestions, new contributors
- List of families to be treated in the Flora: open discussion and planning

15:30 EDIT Platform for Cybertaxonomy: demo session – Dr. E. von Raab-Straube (BGBM)

23/Oct.: NATURALIS BIODIVERSITY CENTER, DARWINWEG 1. AUDITORIUM.

9:30 Opening of seminars program – Prof. Dr. E. Smets

09:45 *Swartzia* (Leguminosae) in the Guianas: what we have learned since the publication of the Flora of the Guianas treatment in 1989 – Dr. B. Torke

10:10 The Lianas of the Guianas fieldguide – Dr. B. Hoffman

10:35 The lichen genus *Cladonia* in the Guiana Highland region –Prof. Dr. T. Ahti

11:00 The lichen family Parmeliaceae in the Guianas – Dr. H. Sipman

11:20 *Coffee break*

11:40 Hermann Herbarium: the oldest plant collection from Suriname – Dr. T. van Andel

12:05 Recent botanical explorations in Southern Suriname – MSc. C. Bhikhi

12:30 Harnessing business support for Floristics: opportunities and implications – Dr. W. Milliken

13:00 *Lunch / Poster session*

14:10 Quick changes in nomenclature: the necessity to update floras and checklists –Dr. C. Feuillet

14:35 Expanding reach through web and mobile apps – Dr. A. Krings

15:00 EU FP-7 Pro-iBiosphere: toward an Open Biodiversity Knowledge Management System – Dr. S. Sierra

15:20 *Coffee break*

15:40 Species composition of the Amazonian forests – Dr. H. ter Steege

16:05 Communications from the meetings and projections

16:30 Drinks & launching of the book:
Flora of the Guianas Series A, fascicle 29: 127. Sapindaceae, by P. Acevedo-Rodríguez

2. MINUTES OF THE ADVISORY BOARD MEETING

Present: P. Delprete, E. Lucas, O. Poncy, P. da Silva, N. Köster, B. Torke, C. Feuillet, D. Traag, T. van Andel, M.J. Jansen-Jacobs, S. Mota de Oliveira.

2.1. Opening and report on previous meeting in Washigton

Evelyne Lucas opened the meeting and asked all members to introduce themselves. The newsletter of the last meeting, in Washington, Nov 2010, was briefly discussed. The recommendation made then to “spread the word” was followed by some members, by bringing the Flora to congresses, as well as by Kew Publishing, by sharing the distribution with Marston Book services and Chicago Press.

2.2. Board personnel changes

Nils Köster was introduced as the new representative of the Botanical Museum and Botanical Garden Berlin-Dahlem (BGBM) in the Flora of the Guianas Board, as previously stated in a letter from Professor T. Borsch to E. Lucas, in April 2012. At BGBM, Nils is the scientific curator of tropical and subtropical living collections. He is a specialist on neotropical Araceae and on neotropical plant diversity in general.

2.3. Memorandum of Understanding

As agreed in the last meeting, the institutes should sign a new Memorandum of Understanding. The following institutes had the document signed: K, L, NY, US, BBS, B. D. Traag mentioned that the delay in signing was due to disappointments concerning the difficulty of getting visa permission for Suriname’s researchers to work in the Netherlands. T. van Andel added that the problems are being slowly overcome, she has been taking action with the P&O of Leiden University and Naturalis. D. Traag agreed with that and stated that the MoU was finally signed because of the improvement of the procedures.

The MoU was not yet signed by P, CAY and BRG. O. Poncy (P) explained that she is not yet sure whether the signing of the MoU will really lead to a commitment from P. She thinks that what the consortium needs is not a simple signature, but also commitment and therefore she needs more time to find out who would be the person, from the management, who could

answer that demand (that would be the person to sign). P. Delprete (CAY) had the same problem, as he was not sure who has the administrative power to sign it (meanwhile, the MoU of the IRD, was signed by the Director on the IRD Center of Cayenne, on 15 April 2013). P. da Silva (BRG) could not have it signed because of a query of the chancellor concerning one of the terms of the MoU: the validity is stated 10 years in one part of the text and 20 years in another part. They need to solve this before signing. D. Traag suggested that we leave 20 years, because this must be a long term project. All agreed with this observation.
E. Lucas closed the discussion of the item saying that she was very satisfied that 6 institutes have signed a new MoU, and that communication with the other institutes will be kept in order to provide more information – if needed – and get all signatures soon.

2.4. Report by the executive editor

By Sylvia Mota de Oliveira & Marion Jansen-Jacobs

Editorship (Mar 2011 – Mar 2013)

Two new fascicles of the Flora of the Guianas were published under the editorship of M. Jansen - Jacobs:

- The subfamily Mimosoideae, with 163 species (178 taxa) occurring in the Guianas and four additional species expected to occur in the region. The Flora descriptions are accompanied by 46 illustrations and a chapter on wood and timber, also illustrated.
- The Musci IV, including the list of all moss species recorded in the Guianas, is the final part of the Moss Flora of the Guianas. The fascicle also offers a compilation of previous publications with updates, adding species recently recorded in the Guianas.

Three old submission were sent back to authors:

- Dilleniaceae (27 species in 6 genera) - Gerardo Aymard and Carol Kellof
- Meliaceae (back to authors after being reviewed by Marion, Piero and Sylvia) – Ted Pennigton and Nicky Biggs
- Rubiaceae part 1, genera A-L (42 genera with ca. 131 species, back to author after being reviewed by Marion) - Piero Delprete

Three new contacts were established, concerning the production of the following treatments:

- Capparaceae – Xavier Cornejo

- Asclepiadaceae – Alexander Krings
- Cabombaceae, Hydrophyllaceae, Hydrocharitaceae – Sabitrie Doerga-Jairam

Five new manuscripts were submitted, in the following time sequence:

- Sapindaceae – Pedro Acevedo-Rodríguez (ready and sent to Kew Publishing)
- Ochnaceae (returned to the author after being reviewed by Marion) – Claude Sastre
- Cladoniaceae – Harrie Sipman and Ted Ahti (ready and sent to Kew Publishing)
- Vitaceae, with 1 genus and 14 species – Julio Lombardi
- Caricaceae, with 3 species in 3 genera – Maarten J.M. Christenhusz
- Marattiaceae (ferns), with 8 species in 1 genus – Maarten J.M. Christenhusz

Furthermore, during the meeting, we launched the Flora of the Guianas Series A Fascicle 29, Sapindaceae, by P. Acevedo-Rodríguez.

Long-term strategy for the Flora of the Guianas

The standard format of taxonomic publications, i.e. hard copy or digitized text, hampers the scientific progress in taxonomy itself as well as in other research fields. A growing body of literature has been discussing the possibilities to change this scenario, by making use of information technology (Wilson 2004; Brach & Song 2006; Clark et al. 2009; Wheeler et al. 2012). Based on these developments, the change of format of the workflow and of the data dissemination channel (hard copy only) of the Flora of the Guianas was proposed to be discussed in the next session.

Already in this direction, the Flora of the Guianas has taken (small) part in e-taxonomy pilots using the EDIT Platform for Cybertaxonomy, carried out in Naturalis. The pilot included a markup schema for the literature (needed for the importation of taxonomic information into the platform database) and the creation of a data portal online.

Naturalis is the coordinator of an EU project, Pro-iBiosphere, which will conduct several pilots with the CDM, a platform for Cybertaxonomy, and coordinate training sessions. Members and contributors of the Flora of the Guianas should also profit from the activities offered by the project. Moving from hard-copy to an e-taxonomy platform, however, involves some technical steps that require funding, such as:

- Mark-up of a fascicles to import into the database and dataportal
- Support from IT department for the maintenance of the platform

- Training of a botanist, preferably from the Guianas, to use the platform

External funding

In order to gather funds for the e-taxonomy activities and for the position of editor-in-chief itself, Sylvia Mota de Oliveira has participated as co-applicant in a NWO (Dutch national research agency grant) call. The proposal was well rated, but not approved. It will be resubmitted in August 2013. She has also applied for a subsidy for the costs of the Flora of the Guianas meeting, with the KNAW – the Dutch Royal Academy for Research. The grant was approved and used to cover the costs of the participation of one board member – P. da Silva and one contributor of the Flora – J. Cornejo, who also extended his stay to work in the treatment of Capparaceae.

Future plans:

- Publication of the manuscripts mentioned above
- Mark-up of published fascicles and creation of a data portal, where all published content of the Flora will be searchable and available online
- Renewing of the website, with updated species checklist and family list

Bottlenecks:

- Funding for mark-up activities
- Funding for editor-in-chief after March 2014

2.5. State of affairs at the participant institutes

2.5.1. B. Botanischer Garten und Botanisches Museum Berlin-Dahlem, Berlin

By Nils Köster

General

Although not on active service anymore, Paul Hiepko and Harrie Sipman continue as volunteers to actively contribute to the FoG. After the retirement of Harrie Sipman, he was succeeded as FoG representative by Nils Köster, since April 2011 curator of tropical and subtropical living collections at Berlin.

According to one of the geographic focal areas of research at Berlin, several projects on evolution and biogeography in Cuba and the Caribbean are carried out involving collaborators from the region. Since Northern South America plays an important role in Caribbean biogeography, species from the Guianas belonging to the genera under study shall be included in the studies. In the context of these activities, it is taken into consideration to look for potential contributors to the FoG for the Polygonaceae (especially *Coccoloba*) and Erythroxylaceae.

Taxonomic research for Flora of the Guianas

Cryptogams (Lichens):

- Cladoniaceae: H. Sipman & T. Ahti. Preparation of the manuscript finalized and sent to Kew Publishing, print scheduled for 2013.
- Parmeliaceae: H. Sipman. The work is being continued with investigations of the genus *Usnea*.
- Thelotremataceae: H. Sipman. The preparation of backlog collections essential for this volume is in progress.

Phanerogams:

- Asteraceae: H.-W. Lack. Inuleae s.l., Tageteae and Lactuceae; status preliminary, no progress since the last report.
- Menispermaceae: P. Hiepko. Good progress since the last report, finalization of the manuscript scheduled for the end of 2013.

Publications

- Normann, F., Weigelt, P., Gehrig-Downie, C., Gradstein, S. R., Sipman, H. J. M., Obregon, A. & Bendix, J. 2010: Diversity and vertical distribution of epiphytic macrolichens in lowland rain forest and lowland cloud forest of French Guiana. Ecological Indicators 10: 1111-1118. doi: 10.1016. j.ecolind.2010.03.008.

2.5.2. BBS. National Herbarium of Suriname, Paramaribo

Written report not received.

Sabitrie Doerga-Jairam as new contributor.

2.5.3. BRG. Guyana National Herbarium, Georgetown

Written report not received.

Comment of the chancellor concerning the MoU is that Guyana cannot contribute with funding. The structure of University of Guyana counts now on a scientific office for Botany.

2.5.4. CAY. Herbier IRD de Guyane, Cayenne

By Piero Delprete

General

The Herbarium of French Guiana (Herbier de Guyane, CAY) is part of the IRD (Institut de Recherche pour le Développement) and the UMR AMAP (Unité Mixte de Recherche - botanique et bioinformatique de l'Architecture des Plantes - CIRAD - CNRS - INRA - IRD - UM2). The support of the IRD for the activities of the herbarium has been constant, but we are experiencing a shortage of personnel, and regular activities have been slowing down. We have a considerable backlog of specimens to be mounted, data to be included in the database, and specimens to be included in the general collection. There is a considerable amount of specimens that have been deposited by consultant agencies (bureaux d'études) working on environmental impact and conservation studies. Starting from January 2013, Chantal Geniez has been hired with a permanent contract as a technician, and she is in charge of managing herbarium collections, entering data into the herbarium database, and assisting in field work. Delprete continues his activities as botanist and head of research of the Herbier de Guyane (CAY), with several ongoing projects, his research on Neotropical Rubiaceae (systematics, taxonomy, and floristics), as well as several floristic projects in the Neotropics, and the coordination of a Franco-Brazilian network (GAP Network). There have been regular visits for field and herbarium work by Molino and Sabatier, mostly collecting and identifying trees from hectare plots. Regular collections are made by Delprete, mostly along the coastal area. In 2011 Tom Croat (MO) visited CAY several times, identified many Araceae specimens, and made considerable collections along the coast. Michael Nee (NY) visited the herbarium in January 2013, and identified most specimens of Cucurbitaceae and Solanaceae present at CAY and made punctual collections of these two families, accompanied by P. Delprete; as he is planning

to retire in April 2013, he communicated that he will have more time finish the FOG treatments of these two families.

Taxonomic research for Flora of the Guianas

- Arecaceae: Granville, J.J. de (Coordinator) 1) *Acrocomia, Asterogyne, Bactris, Chamaedorea, Elaeis, Lepidocaryum, Manicaria, Mauritia, Mauritiella, Syagrus* : ongoing treatment, but no progress since last FOG meeting. *Bactris* still have many taxonomic problems, mostly because of the excessive synonymy made by A. Henderson. 2) *Astrocaryum* : F. Kahn (IRD Montpellier) has not yet submitted his contribution that he promised a long time ago; Granville thinks that he could contribute this treatment, as he has all the elements to complete it. 3) *Attalea* s.l. (including *Maximiliana, Orbignya* and *Scheelea*): the manuscript of S.F. Glassman was received a long time ago, and needs to be updated for the reasons explained in the previous report (FOG Newsletter 17); Granville suggests to contact L. Noblick for the update of this treatment, as his the specialist of this group, and he realized a field expedition in French Guiana in April-May 2012, and he is planning for a second expedition in 2013; these expeditions have the main goal to study and collect the species of *Attalea* present in French Guiana. Also, Noblick could work in collaboration with J.F. Pintaud (IRD Montpellier), who has recently concluded a taxonomic revision of this genus. 4) *Dictyocaryum, Hyospathe, Iriartella, Oenocarpus* s.l. (including *Jessenia*), *Socratea Syagrus*: manuscripts received a long time ago by several contributors. 5) *Geonoma, Desmoncus* : the revisions of these two genera by A. Henderson in 2011, according to Granville, pose several questions with regard to the treatment nearly finished for the FOG, especially for *Geonoma*, because, the nomenclatural changes and the excessive synonymy. 6) In general, the update of nomenclature, keys to genera and species, and illustrations made for the *Guide des Palmiers de Guyane* [Guide to the Palms of French Guiana, to be published in 2013 by the *Office National des Forêts*], is an excellent stimulus for the treatment of the Arecaceae for Flora of the Guianas.
- Balanophoraceae: Delprete, P.G. - The family treatment for FoG has been published by Hansen in 1993. There are a few taxa in the region. However, an amazing discovery of a new species of *Ombrophytum* was made in 2012, which will be a new record for the

Subfamily Lophophytoideae in the Guianas. The manuscript will be submitted by P.G. Delprete in 2014.

- Caryocaraceae: Delprete, P.G. & D. Frame - (2 gen., 6 ssp.): The responsibility of the treatment has been passed from Granville to Delprete & Frame. These two authors will be responsible to write the treatment, including descriptions, keys, and specimens cited. The three line drawings to accompany this monograph are ready (made by Granville). The manuscript is expected to be submitted in 2014.
- Hugoniaceae and Ixonantaceae: Sabatier, D. No progress.
- Humiriaceae: Sabatier, D. A collaboration was started with Léa Baron (doctoral student, with Jerome Chave as thesis director, Toulouse University) on the phylogeny of the family Humiriaceae. As for the FoG treatment, this phylogenetic study will hopefully clarify some taxonomic problems, as for example, the separation of the genus *Schistostemon* and the position of a new species of *Vantanea*, similar to *V. parviflora*, collected in French Guiana by Molino & Sabatier.
- Rubiaceae: Delprete, P.G. This study was started in 2004, with a fellowship form NWO, which financed the author's stay to work for one year in the herbarium of the University of Utrecht. This project included the study of the specimens at the Utrecht Herbarium and on loan from NY and US, for a total of 35,000 specimens. This treatment also counts with the collaboration of several specialists (R. Salas & E.L. Cabral, Instituto de Botánica del Nordeste, Corrientes, Argentina; C.B. Costa, Instituto de Botânica, São Paulo, Brazil; E.B. Souza, State University of Vale do Acaraú, Ceará, Brazil; R. Cortés, Universidad Distrital, Bogotá, Colombia; D. Zappi, Kew Botanic Gardens [now at Singapore Botanic Gardens]; C. Gustafsson & C. Persson, Goteborg University, Sweden). Delprete continued this project in the herbaria of the Federal University of Goiás, Goiânia (Brazil), where he worked as Visiting Scientists and Professor from 2005 to 2008; however, during these four years his priority was to finish the treatment of the Rubiaceae the Flora of Goiás and Tocantins (Delprete, 2010a, 2010b, 2010c). This project was then continued by Delprete at the Leiden University, Naturalis, Leiden (Netherlands), the Museum of Natural History of Paris (France), at the Herbier de Guyane, Cayenne, French Guiana (France), and it is now in its final stage. In 2011, Delprete visited the Herbarium (BBS) of the University of Suriname, Paramaribo, and annotated ca. 5,000 specimens of the genera A to L. The project is now arrived to the study

of the three most difficult genera, *Palicourea*, *Psychotria* and *Spermacoce*, and it will probably be finished in 2014. In addition, the conclusion of the treatment has been slowed down by several taxonomical rearrangements in *Chomelia* and *Stenostomum* (Delprete et al. 2010), and several recent discoveries, as the presence of *Vangueria* (cultivated) and *Stachyococcus*, and a new species of *Sipanea*, and the study of the little-known *Octavia sessilifora* and *Mussaenda glomerata*, which revealed to be synonymous to previously described taxa (Delprete & Persson, 2012). As of today, this study detected 84 genera and 461 species of Rubiaceae in the Guianas. The treatment will be published in three volumes: 1) Volume 1, with key to genera and genera A to L (203 species); Volume 2, with genera M to L (258 species), and 3) Volume 3 (with I. Poole, J. Koek-Noorman & L. Westra), with wood anatomy of woody genera, compared with the family phylogeny.

- Rubiaceae (Typification of the RUBIACEAE described by Aublet): Delprete, P.G. visited P-JJR (Paris) in 2009, and BM and LINN-SM (London) in 2012, for the typification of the 55 taxa of Rubiaceae described by Aublet. It has traditionally been thought that the best set of Aublet's collections is at BM; however, this study revealed that the specimens at P-JJR and LINN-SM are the only one with labels handwritten by Aublet, and they should have the priority when selecting a lectotype for the taxa described by Aublet. The manuscript will be submitted in 2014.
- Index of French Guiana Collectors - M. Hoff (Université Louis Pasteur, Strasbourg) & P.G. Delprete: Delprete has contributed a considerable amount of work during the last 3 years, mostly updating the manuscript, and including new collectors. In progress, to be probably submitted in 2014.
- Pteridophytes: Boudrie, M. - Coordinated by G. Cremers (P), 12 contributors, 9 fascicles, 630 taxa - No new fascicle have been submitted since the last meeting. The 6 fascicles still to be published are: • Fasc. 1 (Generalities, Dicksoniaceae, Marattiaceae, Ophioglossaceae). Marattiaceae: Although an update was recently published by Christenhusz (2010), the revision of the genus *Danaea* is ongoing by H. Tuomisto (TUR). Ophioglossaceae: DNA analyses were carried out on *Ophioglossum* specimens from French Guiana; study in progress with M. Boudrie (CAY) and W. Hauk (DEN). • Fasc. 2 (Cyatheaceae, Gleicheniaceae, Lygodiaceae, Marsileaceae, Metaxyaceae, Schizaeaceae). Cyatheaceae: the general work has not yet been carried out, but the information about this

family for the Guianas is updated via permanent contact with M. Lehnert (STU); a partial revision of American Cyatheaceae was recently published by Lehnert (2011), leading to changes in several names of the Guianan species of *Cyathea*. Gleicheniaceae: the revision of *Sticherus* for the Neotropics was published in 2011 by J. Gonzales (NY) and M. Kessler (Z), but the work for the Guianas is still to be done. Schizaeaceae: revision in progress of the genus *Anemia* by J.T. Mickel (NY); he already revised the CAY material. Other families are completed. • Fasc. 5 (Pteridaceae, Vittariaceae): Pteridaceae : This family is still in progress with M. Boudrie and G. Cremers dealing with the *Adiantum* complex and preparing the manuscript, in collaboration with J. Prado (SP) and B. Zimmer (B). The *Adiantum* material from CAY was revised by J. Prado. *Doryopteris* is still under revision for the Neotropics by J. Yesilyurt (K). *Adiantopsis*, and notably the material from the Guianas, are under revision by M. Link-Perez (AASU), and preliminary results were recently published (Link-Perez et al., 2011). • Fasc. 7 (Aspleniaceae, Blechnaceae, Elaphoglossaceae, Lomariopsidaceae): All families are almost completed by M. Boudrie, G. Cremers & J.T. Mickel (NY) for the Elaphoglossaceae. A few issues remain to be solved in the *Blechnum* group. The completion of this fascicle was expected in 2011 (text was reviewed by Neotropical pteridologists), but it is delayed. Some amendments are necessary, due changes in the previous Lomariopsidaceae and bolbitidoid ferns (description of the new genus *Mickelia* placed into the Dryopteridaceae; Moran et al., 2010); drawings are in progress. • Fasc. 8 (Grammitidaceae, Polypodiaceae): Grammitidaceae: the text of this family has been completed by C. Kelloff (US) and drawings are in progress. However, the family of Grammitidaceae is now included within Polypodiaceae. Amendements of the text have been carried out due to the description of new genera (*Alansmia*, *Ascogrammitis*, *Moranopteris*; Kessler et al. 2011, Sundue 2010, Hirai et al. 2011) with nomenclatural implications in the Pteridophytes of the Guianas. Polypodiaceae: Still under compilation, due to a recent revision on Neotropical Polypodiaceae. • Fasc. 9 (Azollaceae, Isoetaceae, Lycopodiaceae, Psilotaceae, Salviniaceae, Selaginellaceae): Isoetaceae: This family is still under treatment by J. Hickey (MU). The publication on the French Guiana species is still in progress. Lycopodiaceae: The treatment of this family undergoing by B. Øllgaard (AAU), and a revision of the Neotropical Lycopodiaceae was recently published by Øllgaard (2012a, 2012b) with changes of names in Lycopods from the Guianas. Selaginellaceae: currently

studied in collaboration with M. Boudrie. -- Since the first three fascicles have been published, many new taxa have been recorded in the Guianas; therefore, Cremers is planning to prepare an addendum.

- Revisions with nomenclatural changes in the Pteridophytes of the Guianas: All the species previously in *Hymenophyllopsis* have been transferred to *Cyathea* (Christenhusz, 2009). Combinations into *Hymenasplenium* of the creeping-rhizome-bearing *Asplenium* species have been made by Regalado Gabancho & Prada (2011). A revision of the *Hypolepis* species (Dennstaedtiaceae) of the Guianas has been recently published by Schwartsburd *et al.* (2012). The genus *Sticherus* (Gleicheniaceae) was revised by Gonzales & Kessler (2011). The Neotropical bolbitidoid ferns were revised by Moran *et al*. (2010), leading to the description of a new genus, *Mickelia*, and a name change of the well-known *Lomagramma guianensis*. Considerable changes occurred within the ex-Grammitidaceae (now included within Polypodiaceae) with the description of several new genera: *Alansmia*, *Ascogrammitis* and *Moranopteris* (Kessler *et al*. 2011, Sundue 2010, Hirai *et al*. 2011).
- Other work completed during the period 2011-2012: Boudrie, Cremers & Feuillet: Revision of the pteridological data of the "Checklist of the Plants of the Guiana Shield" (Funk et al., 2007). Publication was expected for 2011, but it is still in progress. Boudrie: Revision of the pteridological data (taxonomy, determination of specimens) of the NYBG Flora of Central French Guiana (Saül Region) from the NY website. Data were transmitted to Mori in 2010, but are still to be integrated in the NYBG database. Boudrie: Completion of the list of ferns of French Guiana treated as "ZNIEFF determinant species" (about 80 taxa have been selected over a total of 335 species currently known in French Guiana). Field excursions and miscellaneous: Boudrie, Gonzales and Tostain took part in the inventory mission at the Mount Itoupé – Sommet Tabulaire (central French Guiana), within the Parc Amazonien de Guyane in March-April 2010. A total of 261 specimens of Pteridophytes were collected and deposited at CAY (and other herbaria), in addition to the 105 specimens collected in 1980 by Cremers and Granville. A preliminary report was produced. A few critical specimens are still under study. Two species of Lycopods have been recently discovered, one in 2010, new to the Guianas, *Huperzia acerosa* (Sw.) Holub [= now *Phlegmariurus acerosus* (Sw.) B. Øllg.], at Mount Itoupé, and *Pseudolycopodiella tatei* (A.C. Sm.) Holub, in 2011, new record for French Guiana, located in savannas. *Anemia pastinacaria* Moritz ex Prantl (Anemiaceae),

discovered in 1962 in the savannas of French Guiana, has been rediscovered at a different locality in 2012. Boudrie: Botanical excursions, focused on ferns, in the Reserves of Mont Grand Matoury and Trésor.

Projects

- Frame, D.: Study of the vegetation of French Guiana: Starting from March 2012, D. Frame (CNRS) is complementing the work on the *Checklist of the Trees of French Guiana* (J.-F. Molino, D. Sabatier, M.-F. Prévost, S. Gonzalez & D. Frame) mostly adding information on synonymy and literature of the taxa. This temporary contract is financed by Labex CEBA (see below), which pays for her salary and it has just been renewed for one additional year.
- Sabatier, D. & J.-F. Molino: 1) Contribution to a new set of data for forest inventories for the Amazon Tree Diversity Network (ATDN) coordinated by Hans ter Steege (Naturalis Biodiversity Center, Netherlands): 63 plots in French Guiana with a total of 60 ha studied, ca. 35 000 trees and ca. 1200 species and morpho-species. 2) Botanical studies (3,5 ha inventoried on two sites) within the project “Consequences of the Occupation and Use by Ancient Indigenous tribes on plant Communities” (COUAC) - coordinated by Etienne Dambrine (INRA) and Bruno Hérault (Univ. Antilles-Guyane, Kourou, French Guiana). 3) Project “Case study of monodominance by *Spirotropis longifolia* (Leguminosae) and the associate pant community” - Doctoral Thesis of Emile Fonty, defended in December 2011 at the University of Montpellier: 9 ha inventoried on two sites. 4) Project “Morpho-architecture of the genus *Cecropia*” - Doctoral Thesis of Camilo Zalamea: study of phenological patterns based on herbarium specimens. 5) Project “HABITAT” - Coordinated by Stéphane Guitet of the ONF-Guyane, with the objective to evaluate the interaction between the variability of forest communities and the geographic variation of environmental factors (geomorphology, topography, soils, climate) in French Guiana. 6) Check-list of the Trees of French Guiana (J.-F. Molino, D. Sabatier, M.-F. Prévost, S. Gonzalez & D. Frame): According to the analysis of literature, herbarium specimens present at CAY, and forest inventories, it is esteemed that in French Guiana are present about 1600 species of trees with trunk more than 10 cm DBH.
- Delprete, P.G., R.E. Bone (K) & G. Lolli: Floristic inventory of the coastal savannas of French Guiana: The project on a floristic inventory the coastal savanna of French Guiana is

ongoing. The main goal is producing a comprehensive checklist of the angiosperm and pteridophyte flora, and a regional conservation assessment. Additional aims include the development of a floristic field manual, a project website (http://coastalsavannasfrenchguiana.info/) and a book of landscape photographs and representative species for a general audience. This project, started in 2009, to date has included a study of the specimens (most of them annotated by specialists) present at the Cayenne Herbarium (CAY) has produced 1,500 additional geo-referenced collections and associated high-resolution digital images. As a direct result of detailed exploration of the savannas, areas not previously visited by botanists have been collected, and many new species recorded. The resulting database has a current total number of nearly 5,000 entries, and includes 60 families, 120 genera and nearly 700 species. In 2010-2012, we have received identifications from M. Strong, (US; Cyperaceae), R.E. Bone (K; Lentibulariaceae, Melastomataceae and Ochnaceae), M.L. Rico (K; Leguminosae) and M. Nee (NY; Solanaceae). Our preliminary checklist therefore tripled the estimated number of plant species reported in the historical literature, emphasizing the remarkable biodiversity of this often neglected habitat, and the urgent need of establishing protected area.

- Delprete: GAP Network (France-Brazil Cooperation Program): The GAP Network is network of Franco-Brazilian cooperation, coordinated by staff of IRD (France), IEPA (Macapá, Amapá, Brazil) and Museu Goeldi (Belém, Pará, Brazil), for the study of the vegetation of French Guiana (France), Amapá e Pará (Brazil). The main factors for the scarce knowledge about this area are the difficulty of access and the lack of funds for such expensive expeditions. The region includes the *Parc Amazonien de la Guyane* (3.4 million hectares, French Guiana, France) and the *Parque Nacional Montanhas do Tumucumaque* (3.8 million hectares, Amapá, Brazil); the two parks together form the largest protected area in the World, and the least botanically known in South America. The network counts with about 50 scientists and nine French and Brazilian institutions. Research projects are concentrated in taxonomy, floristics, phytosociology, plant ecology, ethnobotany and genetics. The GAP Network started its activities with the supervision of graduate students with projects focused on this area. A project was submitted for the study of the flora of the Oiapoque River, but it was not retained. A new project will be submitted in 2013.

- The LABEX CEBA (Laboratory of Excellence CEBA): The Laboratory of Excellence CEBA (Centre d'Étude de la Biodiversité Amazonienne; http://www.labex-ceba.fr/en/) "crystallizes a network of internationally recognized French research teams involved in biodiversity research in Amazonia. It fosters cutting-edge research on biodiversity in French Guiana, promotes collaborative research with South American countries, addresses the need for transferring the results of basic research to the society, and contributes to education and training. [...] Tropical forest ecosystems are being converted at a rapid pace for agriculture or urban development, and it is of fundamental importance to understand how this biodiversity contributes to maintaining ecosystem services, how it may provide resources for human welfare, and whether these environmental changes may critically alter this biodiversity. French Guiana, an overseas Region of France, is an ideal natural laboratory for tropical biodiversity, gathering an unparalleled scientific expertise in the fields of biodiversity research, tropical medicine, tropical forestry, and evolutionary ecology. Because of its networked structure, its focus on scientific excellence, and its long-term capacity, CEBA is in a unique position to promote innovative research in the field of biodiversity in French Guiana, and act synergistically between academia and stakeholders." The Labex CEBA is a network of several French institutions and more the 80 scientists, with a budget of 12 million Euros for a period of ten years.

Visiting Scientists and persons consulting the herbarium

From January 2011 to January 2013 we received the following specialists for studies directly related to the Flora of the Guianas:

- Tom Croat (MO), to study Araceae (March, August and September 2011).
- Lucile Allorge (P), to study Apocynaceae (March 2012).
- Larry Noblick (FTG), to study Arecaceae (April 2012).
- Michael Nee (NY), to study Cucurbitaceae and Solanaceae (January 2013).

In addition, from January 2011 to January 2013, the herbarium recorded 785 entries of persons that consulted the collection for vegetation studies of French Guiana, most of them in the areas of floristics, taxonomy, ecology, conservation, and environmental impact assessments. Among them, many scientists came from the following institutions: National Museum of Natural History, Paris (P, France), National Herbarium of the Netherlands, Leiden

(L), Utrecht University, Trésor Reserve (Netherlands), New York Botanical Garden, Bronx (USA), Missouri Botanical Garden, St Louis (USA), Fairchild Tropical Garden, Miami (USA), Cardiff University (United Kingdom), University of California, Los Angeles (USA), University of Mainz (Germany), IRD (France), CIRAD (France), CNRS (France) ENGREF (France), ONF (France), CNES (France), Parc Amazonienne de Guyane (France), University of Grenoble (France), Free University of Bruxelles (Belgium), University of Utah, Salt Lake City (USA), University of Toulouse III (France), Universidade Federal Rural da Amazônia, UFRA, Belém (Brazil), and Museu Paraense Emílio Goeldi, Belém (Brazil).

Publications

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2.5.5. K. Royal Botanic Gardens, Kew

By Eve Lucas

Taxonomic research for Flora of the Guianas

- Labiatae: R.M.Harley. Author retired, current commitment to Flora unknown.
- Meliaceae: N.Biggs, T.D.Pennington. Manuscript back from the editorial office, to be published soon.
- Sapotacae: S.Edwards, T.D.Pennington. *Pouteria* is finished. Terry Pennington is seeking funding for completion of the fascicle. Completion date unknown.
- Myrtaceae: E. Lucas et al. Preliminary work continues.
- Caricaceae: Maarten Christenhusz (University of Helsinki), currently based part time at Kew: Manuscript complete and sent to editorial office. It might be published in 2013 with Passifloraceae.
- Marattiaceae: Maarten Christenhusz. Manuscript completed, sent to editorial office.
- Euphorbiaceae: *Euphorbia* complete. Also *Haematostemon*, *Omphalea*, *Pera*, *Plukenetia* and *Tragia*, prepared by Lynn J. Gillespie. Maarten cannot commit to completing the family and suggests Hajo Esser to coordinate.
- Lentibulariaceae: P. Taylor (manuscript submitted in 1991, reviewd by A.R.A., incomplete) - Apparently P. Taylor retired and is no longer active. P. Delprete is interested to finalize the manuscript as co-author (he's about to describe a new species of *Utricularia* from French Guiana)

Publishing affairs

Since the last FoG meeting (Dec 2010), the following fascicles were launched:

Series A: Fascicle 28 (Mimosaceae); published 2011

Series C: Bryophytes Fascicle 2 (Musci IV); published 2011

Series A: Fascicle 29 (Sapindaceae); published 2012

Trade distribution continues with Marston Book Services Ltd (since August 2009) for all regions excluding United States, Canada and Mexico. The University of Chicago Press now distribute for K in United States, Canada and Mexico (since November 2009).

Flora of the Guianas sales January 2010 - September 2012	Kew sales (www.kewbooks.com, Kew Enterprises, Kew Publishing)		Marston Book Services (distribution partner for World exc. North America & Mexico)		University of Chicago Press (distribution partner for North America & Mexico)		Total units	Total net revenue
Title	**Units sold**	**Net revenue**	**Units sold**	**Net revenue**	**Units sold**	**Net revenue**		
Flora of the Guianas. Series A: Phanerogams Fascicle 18	0	£0.00	7	£66.39	0	£0.00	**7**	**£66.39**
Flora of the Guianas. Series A: Phanerogams Fascicle 19	0	£0.00	4	£41.42	1	£12.00	**5**	**£53.42**
Flora of the Guianas. Series A: Phanerogams Fascicle 20	1	£9.90	7	£68.19	0	£0.00	**8**	**£78.09**
Flora of the Guianas. Series A: Phanerogams Fascicle 21	0	£0.00	9	£83.74	0	£0.00	**9**	**£83.74**
Flora of the Guianas. Series A. Phanerogams Fascicle 22	0	£0.00	6	£162.70	0	£0.00	**6**	**£162.70**
Flora of the Guianas. Series A: Phanerogams Fascicle 23	0	£0.00	8	£262.52	0	£0.00	**8**	**£262.52**
Flora of the Guianas. Series A: Phanerogams Fascicle 24	2	£68.40	7	£253.50	1	£41.70	**10**	**£363.60**
Flora of the Guianas. Series A: Phanerogams Fascicle 25	0	£0.00	9	£330.75	1	£39.75	**10**	**£370.50**
Flora of the Guianas. Series A: Phanerogams Fascicle 26	8	£211.20	0	£0.00	0	£0.00	**8**	**£211.20**
Flora of the Guianas. Series A. Phanerogams Fascicle 27	2	£57.60	7	£227.80	0	£0.00	**9**	**£285.40**
Flora of the Guianas. Series A: Phanerogams Fascicle 28	0	£0.00	75	£3,430.00	21	£1,140.73	**96**	**£4,570.73**
Flora of the Guianas. Series A. Phanerogams Fascicle 29	0	£0.00	0	£0.00	0	£0.00	**0**	**£0.00**
Flora of the Guianas. Series C: Bryophytes Fasicle 2	0	£0.00	50	£2,266.25	0	£0.00	**50**	**£2,266.25**
Flora of the Guianas. Series C: Bryophytes Fascicle 10	0	£0.00	3	£46.20	0	£0.00	**3**	**£46.20**
Flora of the Guianas. Supplementary Series: Fascicle 3	0	£0.00	4	£133.76	0	£0.00	**4**	**£133.76**
Totals	**13**	**£347.10**	**196**	**£7,373.22**	**24**	**£1,234.18**	**233**	**£8,954.50**

2.5.6. L. Nationaal Herbarium Nederland, Leiden

By Tinde van Andel

General

Since 2010, the National Herbarium of the Netherlands (including the former Utrecht Herbarium) is part of Naturalis Biodiversity Center (www.naturalis.nl). The entire collection will be digitized within the coming years. In March 2011, Sylvia Mota de Oliveira was appointed as editor of the Flora of the Guianas for three years.

We expect to launch the book "Lianas of the Guianas", by Bruce Hoffman, published by KIT Publishers, Amsterdam, in the summer of 2013.

Taxonomic research for Flora of the Guianas

- Annonaceae: Paul Maas published his parts online (website FoG). Haimo Rainer needs to finish his part (*Annona*), no information about progress. Guatteria was planned by Uwe Scharf, is now being taken over by Westra and Maas.
- Bromeliaceae: Eric Gouda. Manuscript is almost finished, but illustrations are lacking. Gouda will restart working on the illustrations middle 2013. Bruce Holst needs to finish the highland taxa, no information about progress.
- Gentianaceae: Marion Jansen-Jacobs, Lena Struwe, Hiltje Maas-van de Kamer & Paul Maas have finished the text of the manuscript, Struwe is working on the copyright for the illustrations. Legends for illustrations are still needed. Submission planned to April/ May 2013.
- Marcgraviaceae: Ad de Roon passed away in 2011; Stefan Dressler is willing to prepare the manuscript.

Expeditions

Chequita Bhikhi carried out an expedition to the Brokopondo Lake (2011) and participated in two RAPs of Conservation International: to Sipaliwini (Kwamalasemutu, 2010) and the Grensgebergte and Kasikasima mountains (2012). Plant collections have been deposited at the BBS (Suriname) and L (the Netherlands).

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2.5.7. NY. New York Botanical Garden, New York

By Benjamin Torke

General

Since the meeting in Washington in 2010, the New York Botanical Garden has made significant advances in the ongoing digitization of its herbarium collections, adding 299123 specimens to the Virtual Herbarium during the past year alone. The database now holds 1,757,469 specimen records and 668, 264 images and other multimedia items. Ongoing cataloguing projects cover all vascular plants from Brazil (to be completed in 2013), all plant and fungi from the Caribbean (2014), and all legume groups monographed by Rupert Barneby (2013). For a full list of electronic catalogues at NYBG, see: http://sciweb.nybg.org/science2/VirtualHerbarium.asp.
I have been progressing toward a new comprehensive monograph of *Swartzia*, a genus of about 200 species that is well represented in the Guianas. Treatments of several large sections of the genus are nearing completion. The preliminary data and descriptions can be found on

the *Swartzia* Pages website, which, when it is completed, will comprise an electronic version of the monograph. The data can be used for an update of the treatment published in Flora of the Guianas.

NYBG scientists are producing electronic monographs for a number of large neotropical plant groups, including Lecythidaceae, Ericaceae, tribe Miconeae of Melastomataceae, the genus *Swartzia* (Leguminosae), as well as the fern genera *Megalastrum* and *Elaphoglossum*. We also have a grant to produce electronic monographs based on Barneby's major works in Leguminosae.

Taxonomic research for Flora of the Guianas

- Simaroubaceae (including Picramniaceae): Wayt Thomas. Not actively working on a manuscript, but says he intends to do it; recommitted to produce manuscript within five years (2018).
- Burseraceae: Douglas Daly. Not actively working on a manuscript, but says he intends to do it; recommitted to produce manuscript within five years (2018).
- Gentianaceae: Marion Jansen-Jacobs, Lena Struwe, Hiltje Maas-van de Kamer & Paul Maas have finished the text of the manuscript, Struwe is working on the copyright for the illustrations. Legends for illustrations are still needed. Submission planned to April/ May 2013.
- Solanaceae and Cucurbitaceae: Mike Nee: Actively working on treatments; recommitted to finish both manuscripts within five years (2018); retired from NYBG staff in Spring of 2013.

In the 2012 meeting in Leiden, Benjamin Torke agreed to begin contacting specialists in Leguminosae to organize treatments for a future volume of Flora of the Guianas on Papilionoideae.

2.5.8. P. Muséum National d'Histoire Naturelle, Paris

By Odile Poncy

General

The general situation at P is the same for the last five years : still critical in terms of scientific as well as technical staff , no plan to hire additional staff for taxonomic research in the Guianas in the next future. At the moment, two botanists are still interested in the Guianas: C. Sarthou (phylogeography, inselbergs), and Odile Poncy, who was fully involved in Herbarium renovation until the end of 2012.

Progress of the important projects at P/PC:

1. Renovation of the Herbarium:

The works in the building - started in Aug 2009- will be soon finished (spring 2013). The renovation of the herbarium collections comprised two projects carried out by two distinct private operators. 1) "cancelling the backlog": ca. 1 million specimens were mounted and sorted to family in 4 years (2008-2012), 2) scanning the entire algae + phanerogam collection (ca. 6 million sheets), 3) reconditioning, rearranging and installing in the renovated collection rooms. The collections are presently in the last phase of their reintegration in the renovated herbarium rooms.

2. LAPI: the project includes scanning all types from all geographic areas, completion planned middle 2013.

Taxonomic research for Flora of the Guianas

- Apocynaceae: Lucile Allorge. Since discussion in 2008 with Marion at U - editorial problems, updates - half of the corrections were completed. Andrea Pozetti Spina (Brazil) had revised *Himatanthus* (2004), and a taxonomic synopsis of this genus was published in December 2013 (Pozzetti Spina et al., Taxon 61: 1304-1307. 2013). Marion Jansen-Jacobs proposed to help completing the manuscript as co-author. In the meantime, several nomenclatural changes (including at generic level) were published based on accurate phylogenetic studies. The treatments need to be updated. The author does not wish to do this work herself and suggests that anyone interested in contributing would be welcome as a co-author.
- Cyclanthaceae: L. Barrabé & O. Poncy. Treatment almost completed (format and english corrections to be incorporated; one new species to publish). No progress at the moment.
- Monimiaceae: M. Pignal & J. Jérémie. Same status as in 2006 - the treatment needs updates according to the recent issue in Fl. Neotropica (Renner, 2005). Illustrations ready for all species.

- Ochnaceae: Claude Sastre. Manuscript submitted by the end of 2006 (*Ouratea* separated). First comments by Marion. Illustrations submitted June 2008 (copies - 20 plates, *Ouratea* species illustrated in the last paper may be included). The complete manuscript in the right format was sent to the editor in 2010, as well as the illustrations.

Expeditions

Odile Poncy has done fieldwork in Nouragues - inventory of trees of the plots involved in the phenology project during 2 weeks in Oct/ 2011.

Publications

- Barneby, R., Grimes, J., & Poncy, O. 2011. Leguminosae-Mimosaceae, In: Jansen-Jacobs, M.M. (Ed.) Flora of the Guianas, Series A, fascicle 28. Kew Publishing. Kew, UK.

2.5.9. US. United States National Herbarium, Washington

By Pedro Acevedo and Christian Feuillet

General

At the Smithsonian, 10+ persons are involved and one wishes to join. Jun Wen is interested in doing the Araliaceae. Sara Alexander maintains the database of specimens from the Guiana Shield. Concerning the Algae, no action has been undertaken and both algologist doing floristic works retired.

Note on early Guianas plant collectors represented in Vienna (W) by L. J. Dorr, US National Herbarium (US): The herbarium of the Naturhistorisches Museum in Vienna (W) has a wealth of 19th century collections made in the Guianas. On a quick visit there in March 2012, I noted specimens collected by the following collectors – Guyana: Robert Hermann Schomburgk (1804-1865); Suriname: Friedrich Wilhelm Rudolf Hostmann (1794-1864); August Kappler (1815-1887), especially exsiccatae edited by Rudolph Friedrich Hohenacker (1798-1874); Frederik Louis Splitgerber (1801-1845); Christoph Weigelt (d. 1828); Heinrich Rudolf Wullschlägel (1805-1864); and French Guiana: Paul Antoine Sagot (1821-1888).

Update 2 to the Checklist of the Plants of the Guiana Shield: Christian Feuillet is working with Sara Alexander to produce the update. It should be ready in 2013 with an important chapter on the Pteridophytes by Michel Boudrie, Georges Cremers and collaborators.

Taxonomic research for Flora of the Guianas

- Boraginaceae: Christian Feuillet. The treatment is nearly completed and will be submitted during the winter 2012–2013.
- Commelinaceae: Bob Faden is hoping to finish the manuscript this year.
- Compositae: Vicki Funk. No action on the manuscript, all efforts have focused on various checklists, trying to complete at least the ants and the moths before the Biological Diversity of the Guiana Shield Program ends.
- Cyperaceae: Mark Strong. The status for the sedge treatment has not changed from last year; 80% completed, Mark Strong is still waiting for treatments of the Mapanioid genera and *Eleocharis* from collaborators.
- Dilleniaceae: Carol Kellof. Ready, except for inputs from Gerardo Aymard. Planned to be resubmitted in May 2013.
- Malvaceae: Larry Dorr. Notes and an early draft treatment of the Malvaceae for the *Flora of the Guianas* are now organized in APG format (i.e., by subfamilies). Brownlowoideae and Grewioideae were published as “Tiliaceae” by Jansen-Jacobs and Meijer (1995) and the remaining subfamilies are the focus of my efforts. This past year I was able to visit three herbaria in Europe, and revised Byttnerioideae, Helicteroideae, and Sterculioideae in Leiden (L, old U collection), Byttnerioideae and Helicteroideae in Kew (K); and Malvoideae in Vienna (W). I plan to revisit Leiden and London, at least, in order to work through the remaining subfamilies – L. J. Dorr, US National Herbarium (US).
- Passifloraceae: Christian Feuillet. The treatment will be submitted during the winter 2013–2014 .
- Polypodiaceae: Carol Kellof. Taxonomy important changes require adapting the manuscript.

Expeditions

Fieldwork was carried out in the Pakaraima Mts. (Guyana) from May 10th to June 17th 2012 by Karen Redden (UDC), Kenneth Wurdack (US) and Erin Tripp (RSA). This first scientific

expedition to ascend Kamakusa, a mid-elevation tepui east of Imbaimadai, yielded over 1100 numbers of vascular and non-vascular plants.

Publications

- Acevedo, P. 2012. Sapindaceae. Flora of the Guianas, series A, fascicle 29. Kew Publishing. Kew, UK.
- Acevedo, P. 2011. Four new species of Sapindaceae from the Guianas. *Phytokeys* 7: 11–20.
- Acevedo, P. 2011. *Allophylastrum*: a new genus of Sapindaceae from Northern South America. *Phytokeys* 5: 39–43.
- Feuillet, C. 2010. Folia taxonomica 18. The status of *Passiflora citrifolia* and a new species in subgenus *Astrophea* (Passifloraceae), *Passiflora jussieui*. *J. Bot. Res. Inst. Texas* 4(2): 609–614. (23 Nov 2010).
- Feuillet, C. 2010. Folia taxonomica 19. Typifications in *Dilkea* (Passifloraceae). *J. Bot. Res. Inst. Texas* 4(2): 615–617. (23 Nov 2010).
- Kelloff, C.L., Alexander, S.N., Funk, V.A., & Clarke, H.D. 2011. Smithsonian Plant Collections, Guyana: 1995–2004, H. David Clarke. *Smithsonian Contributions To Botany*, 97: 1-307.

2.6. Discussion items

2.6.1. Update of classification system for the Flora of the Guianas: APG III

During the last meeting of the Flora of the Guianas, it was briefly discussed the possibility of moving the Flora from Cronquist to APG III classification system. In Washington, P. Delprete suggested that the board members continued the discussion during the meeting in Leiden. He offered to give a presentation on the issue and to prepare an overview of the possible change. After Delprete's presentation and further discussion (see Seminar 4.1 and Appendix 1), the board members have decided that the editorial office should strongly recommend future treatments of families delimited according to APG III.

2.6.2. Museu Emilio Goeldi, Brazil, as new partner institute

Piero Delprete is coordinating the GAP network, a French- Brazilian network that involves botanical studies in French Guiana, Amapá and Pará States, in Brazil. He proposes that the Flora of the Guianas board invites MPEG – Museu Paraense Emilio Goeldi – as participant institute. Piero is Professor and is a member of the graduate program of the MPEG/UFRA (Universidade Federal Rural da Amazonia) and he has been working intensively with some botanists of the Museum (such as Anna Luiza Ilkiu-Borges). He sees many possibilities for the Flora, such as the participation of students from MPEG, the financial support given by the Brazilian government to taxonomic research and fieldwork, etc. E. Lucas asked why would we need an institutional commitment from MPEG, in the Flora board, for these activities? Delprete answered that the graduate program of the MPEG/UFRA counts on many professors active in taxonomy and many students that could participate for the treatments of families for the Flora of the Guianas, mostly for families left without any active specialist. Also, training of student in the Amazon Basin and in the Guianas should be one of the main goals for FOG. This will allow the continuation of taxonomy in the region. Also, he thinks that another institute, especially an institute actively investing in plant systematics and taxonomy, will only strength the Flora, and will help for international fundings. M.M. Jansen-Jacobs argues that having MPEG in the board can lead to a claim of expanding the area of the Flora of the Guianas to certain areas of the Brazilian Amazon, which would only delay the production of fascicles. In response this comment, Delprete answered that the flora of the Guianas and that of the state of Para is very similar, and it will be of mutual advantage to have this kind of collaboration, mainly in vision of the paucity of taxonomists in Europe and in the USA. E. Lucas suggested that we all think of the possibility, and stated that the issue worth further investigation; it might be good for the Flora.

3. MINUTES OF THE GENERAL MEETING

Present: P. Delprete, E. Lucas, O. Poncy, P. da Silva, N. Köster, B. Torke, C. Feuillet, D. Traag, T. van Andel, M.M. Jansen-Jacobs, S. Mota de Oliveira, S. Dressler, A. Krings, S. Jairam-Doerga, S. Sierra.

E. Lucas welcomed all contributors joining the board members in this afternoon session and made a short description of the morning session. New contributors, such as S. Jairam-Doerga and Alexander Krings, were asked to introduce themselves in general and to mention what will be their contributions to the Flora. The agenda contained two items: e-taxonomy and an update of the list of familie's authors.

3.1. EDIT Platform for Cybertaxonomy

As a first attempt to present possibilities for the moving into e-taxonomy, Dr. E. von Raab-Straube (BGBM) was invited to demonstrate an e-tool for taxonomic treatments, EDITor. EDITor is part of the EDIT Platform for Cybertaxonomy, developed during the European Distributed Institute of Taxonomy (EDIT) project. This e-platform offers a collection of tools and services which together cover all aspects of the taxonomic workflow, and it is supported by the Common Data Model (CDM), a repository for every conceivable type of data produced by taxonomists in the course of their work, which allows: online publication and open access of legacy data and information; preparation of taxonomic treatments; remote collaboration between specialists in different institutes (which speeds up publication); update of treatments and inclusion of (new) species; etc.
All information about the Platform for Cybertaxonomy and also a manual to use the EDITor can be found at: http://wp5.e-taxonomy.eu/

3.2. List of families' authors

All participants looked together at the current status of the familie's authors list. Some of the commitments made in the past do not hold anymore, due to decease of specialists or lack of time and interest. These cases were pointed out and, where possible, suggestions of new contributors were made. An updated version of the familie's authors list (Appendix 2) will be published in the website of the Flora of the Guianas.

4. ABSTRACTS OF SEMINARS

4.1. Ongoing floras and modern classification: How should we organize our familiers?

Piero G. Delprete - IRD, Herbier de Guyane, Cayenne, French Guiana (France) - piero.delprete@ird.fr

Plant classifications from the end of the 19th century to the end of the 20th century were based upon the analysis of characters to produce an intuitive evolutionary hypothesis through a phenetic approach. The first of these classifications is that of Bentham and Hooker (1862-1883), followed by Engler's Syllabus (Melchior & Werdermann, 1954-1964), and Cronquist's classification (1968, 1981, 1988). Cronquist's classification has been the primary reference until the beginning of the 21st century. Ongoing monographic series (e.g., Flora Neotropica), textbooks, and floristic treatments referred, and many still refer, to this classification as the standard reference (e.g., Heywood, 1993; Mabberley, 1997; Smith, 2004). Takhtajan's classifications (1968, 1988, 1997, 2009), were often presented side by side with those of Cronquist, and were similar in many aspects, mostly by recognizing two classes of flowering plants, Magnoliopsida (dicotyledons) and Liliopsida (monocotyledons). The main innovation in contemporary classification is that proposed by the Angiosperm Phylogeny Group (APG), a group of systematists that has as main goal to establish a consensus on the classification of flowering plants, based primarily on molecular phylogenies. The first publication the APG (1998) treated previous classifications as outdated, and rejected them because the groups recognized have not been tested to be monophyletic. In the first APG (1998) phylogeny, clades above the order level were given informal names (e.g., commelinoids, eurosids, euasterids). The most revolutionary result was that the flowering plants are no longer divided into the two formal groups, as the dicots where found as two groups, the basal dicots, with the monocots closely related, and the eudicots as a sister group to both of them. The second publication of the APG (2003) was an update to the first publication, where changes and additions were proposed when supported by "substantial evidence". The most recent classification proposed by the APG III (2009) confirmed the general backbone of the phylogeny proposed in the previous APG publications, and included the positioning of several families and genera that were previously treated as unplaced. This was done by including them into a wider delimitation of new families and orders. Also, the number of orders was increased from 45 (APG II) to 59 (APG III), and the number of families was reduced from 457 (APG II) to 415 (APG III). Along

with the APG III classification, a Phylogenetic classification of land plants (Chase & Reveal, 2009) and a linear sequence of the families was published, all arranged according to formal ranks, as recognized by the APG III (Haston et al., 2009). This linear sequence is very useful for the organization of families in herbaria and for the publication of floristic treatments. **Users:** Starting from its first publication, the APG phylogenies and classifications became more stable and started to be accepted by the general public. Various textbooks in plant systematics (Judd, 1999, 2002, 2007; Maas & Westra, 2005; Simpson, 2006, 2010; Souza & Lorenzi, 2005, 2008, 2012) and floristic publications (see below) started to use the APG classifications. A significant number of major herbaria, including Kew and Paris (the Utrecht Herbarium was the first to be re-organized according to the APG system) have changed or are changing the order and delimitation of the families in their collections following the APG publications. A number of country and family checklists have been arranged according to the APG III, as, for example, the World Checklist of Selected Plant Families, and the checklists of Brazil (Forzza et al., 2010) and Colombia (Bernal et al., in progress). **Floristic series in the Neotropics:** Long-ongoing floristic treatments, with volumes published at irregular intervals, usually take long time to be accomplished. For this reason, they have a tendency to maintain the family classification chosen at the beginning on their organization. In the Neotropics several of these treatments have been initiated in the 1900s, which have adopted different strategies about family classifications. In Central America, *Flora Mesoamericana* and the *Manual de Plantas de Costa Rica*, both multi-volume series that were started towards the end of the 1900s, using the Cronquist classification, but during the last few years they are gradually switching to the APG system (B. Hammell, pers. comm.). In South America, several country floras have been initiated in the 1900s, but several of them have been interrupted. The two ongoing floristic series in South American countries are the *Flora of Ecuador* and the *Flora of the Guianas*. *Flora of Ecuador* published its first volume in 1973, and has been arranging the families according to *Engler's Syllabus der Pflanzenfamilien*, ed. 12 (Melchior & Werdermann, 1954-1964), which has been followed up to the most recent volumes. The contemporary editors feel that the family classification and definition will be up to the contributors (C. Persson, pers. comm.). **Flora of the Guianas:** The *Flora of the Guianas* was started in 1984, as an expansion of the *Flora of Suriname*. The classification adopted was that of Cronquist (1981), which in those days was recently published. The first volume was published by Paul Maas (1985), with

color and black & white plates, along with line drawings; it included the families Musaceae (incl. Streliziaceae, Heliconiaceae), Zingiberaceae (incl. Costaceae) and Cannaceae (order Zingiberales according to Cronquist's but need to add Marantaceae, according to the APG III). Talking about the Angiosperms, as of today, 27 years after its first publication, about 67 families of flowering plants were published, and a few families are under revision, out of a total 207, according to the Cronquist classification. **Advantages to change classification:** 1) To have a natural system of classification made of strongly supported monophyletic groups; 2) The system adopted and the family published will also become a teaching tool and will also be shown to the general public so that they could learn the modern delimitation of families; 3) Stimulate new treatments, as, according to the APG III, some families are smaller, and some families are bigger; however, many families were segregated from bigger families and became easier to treat. 4) When comparing the two systems, it is actually amazing to see a few little changes need to be made. In fact, the intuitive phylogenies produced by Cronquist and Takhtajan are generally very similar to those produced with molecular phylogenies. The major difference was that the monocots are inserted inside the dicots, and that there is a ancestral group called the "basal monocots." **How to change a series that started from Cronquist to the APG System?** 1) to publish a table that compares the two systems, with family numbers following the Cronquist system, and numbers that follows the APG III system. 2) to publish a volume explaining the passage from the Cronquist to APG III System; 3) In the same volume to publish a key to the families occurring in the Guianas, according to the APG III classification (See appendix 1 for more details, and a comparative table of families following the two systems).

4.2. *Swartzia* (Leguminosae) in the Guianas: what we have learned since the publication of the Flora of the Guianas treatment in 1989.

Benjamin M. Torke - The New York Botanical Garden, USA - btorke@nybg.org

With approximately 200 species, the genus *Swartzia* (Leguminosae) is ubiquitous in lowland rainforests throughout the Neotropics. In his 1989 treatment, Richard Cowan listed 50 species as recorded or probable for the Flora of the Guianas. Subsequent taxonomic studies have added about ten species, making the Guianas an important epicenter for the evolutionary

diversification of the genus. The taxonomic diversity of *Swartzia* in the Guianas will be discussed in light of recent phylogenetic work on the genus and contrasting scenarios on the evolution and assembly of the Neotropical flora. The presentation will conclude with a summary of taxonomic changes and discussion on how existing Flora of the Guianas treatments might be updated.

4.3. The Lianas of the Guianas fieldguide

Bruce Hoffman - Nationaal Herbarium Nederland, Naturalis Biodiversity Center, The Netherlands - bruce.hoffman@naturalis.nl (with contributions from: Mark Plotkin, Frits van Troon, Marc van Roosmalen; graphic design by Nancy M. Hoffman)

Lianas are the woody vines that have come to epitomize tropical rainforests around the world. The evolution of a climbing habit has occurred in many unrelated plant groups using specialized structures such as twining shoots and clasping stems, tendrils, hooks, angled petioles, spines, adhesive roots and rough surfaces. In recent decades, research has shown that climbing plants are important components of tropical forest diversity (up to 40% of species), biomass (up to 45% of stems), subsistence livelihoods, and forest gap dynamics. However, woody climbers remain among the most poorly known tropical forest life-forms, largely due to their inaccessibility. The *Lianas of the Guianas Fieldguide* aims to increase taxonomic, morphological, and ecological understanding of the woody climbers occurring in the forests of Guyana, French Guiana, and/or Suriname. It will facilitate identification of taxa (woody and subwoody vines, climbing shrubs, woody hemi-epiphytes) for both specialists and non-specialists using an image rich, beautifully-designed format, a vegetation-centered key to family and genera, and plant character icons. Chapters are organized alphabetically by plant family and names follow the APG III classification. Approximately 55 families, 215 genera, and 550 species are described, with an additional 575 species in a comprehensive checklist that includes non-woody climbers. The guide is expected to serve as a useful educational, scientific, and conservation tool for all individuals and organizations interested in the biodiversity of the Guianan Shield and the Neotropics at large.

4.4. The Guianas and the lichen family Parmeliaceae

Harrie J. M. Sipman - Botanischer Garten & botanisches Museum Berlin-Dahlem, Germany - h.sipman@bgbm.org

The lichen family Parmeliaceae includes many conspicuous macrolichens and is therefore well-known. It is mainly distributed in regions with a cool climate, like the boreal zone or the tropical mountains. For the Guianas, predominantly consisting of tropical lowland, nevertheless 78 species in 11 genera have been identified so far. This is mainly the result of expeditions organized by the staff of the Utrecht herbarium in recent decades for the FoG project. By far most species, 74, were found in Guyana, 32 in French Guiana, and 31 in Surinam. The largest genus is *Parmotrema*, with 20 species, followed by *Hypotrachyna* with 12 species. The genera *Bulbothrix* and *Relicina*, specialists of tropical lowland forests, are remarkably diverse, with several new species found during the study of the Guianas material, two of which are so far known only from the Guianas. They may be endemic, but it is also quite possible that they remained so far unnoticed in adjacent countries. A more likely endemic species, found several times in French Guiana and Surinam and not known outside the Guianas, is *Parmotrema gradsteinii*. Further notable is the presence of 12 species of beard lichens (genera *Oropogon* and *Usnea*), which are usually associated with mountain forest. Some were found in the Pakaraima mountains, but for most the lower hills seem to give already sufficient humidity increase.

4.5. The lichen family Cladoniaceae in the Guiana Shield region

Teuvo Ahti - Botanical Museum, Finnish Museum of Natural History, University of Helsinki, Finland - teuvo.ahti@helsinki.fi

In a recently completed survey by H. Sipman and myself on the lichen family Cladoniaceae in the Guiana Highland region, 45 species of *Cladonia* (incl. *Cladina*) and two species of *Cladia* were recognized. The study was not restricted to the Guianas, but covered the whole Guiana Shield region, because field work was conducted on the Shield in the Guianas, Venezuela and Colombia. In French Guiana 13 species were recorded, in Guyana 46 and in Suriname 21. Although much of the work was based on the volume on Cladoniaceae published by me in the Flora Neotropica Monographs (2000), it was astonishing to find as

many as 10 new species, which are described as new to science. In fact, the Guiana region is an outstanding area as to the terricolous lichens, because it harbours numerous, often very distinct, endemic species. However, several widespread lichens occur there as well, and the taxonomic status of some species is not fully clear. Many species show considerable variation in their secondary chemistry, which was studied by means of thin-layer chromatography.

4.6. The Hermann Herbarium: the oldest plant collection from Suriname (ca. 1689).

Tinde van Andel – Nationaal Herbarium Nederland, Naturalis Biodiversity Center, The Netherlands - andel@nhn.leidenuniv.nl

The National Herbarium of the Netherlands houses a 17th century, bound herbarium containing 51 dried specimens from Suriname, which was composed by the well-known botanist Paul Hermann (1646-1695). Most specimens are accompanied by (pre-Linnaean) Latin or vernacular names and sometimes by Latin descriptions of the plants and their uses. To assess the importance of this collection for the present-day flora and ethnobotany of Suriname, we identified all specimens (one by using ancient DNA analysis), translated the Latin texts, traced back the origin of the herbarium in national archives, 17th century and modern literature and compared plant names and uses with present-day ethnobotanical data. We digitized the entire herbarium and made it available online (http://www.hermann-herbarium.nl). The specimens were probably collected around 1687 by a certain Hendrik Meyer, who had a keen interest in botany and indigenous plant use. The 50 species in the herbarium are almost all useful plants: cultivated crops, wild edible fruits, medicinal plants, timber trees, fish poison, colorants and roof thatch material. Most species are used similarly today, and more than half of the vernacular names still exist in the region. The presence of *Abelmoschus esculentus* and *Sesamum indicum* in the herbarium prove the early establishment of African food plants in the emerging plantation economy of Suriname. Unlike Hermann's collections from Ceylon and the Cape, this herbarium was never seen by Linnaeus and therefore does not contain any type specimens. However, being Suriname's oldest known plant collection and accompanied by vernacular names and plant uses, this herbarium is of great ethnobotanical, historical and cultural importance.

4.7. Recent botanical explorations in Southern Suriname

Chequita Bhikhi & Olaf Bánki - Nationaal Herbarium Nederland, Naturalis Biodiversity Center, The Netherlands - cheqbr@gmail.com

The Guianan forests, as being part of Amazonia, belong to the largest areas of pristine tropical rainforest in the world. In general not much is known of the biodiversity in the South of Suriname, and it is one of the least botanically explored areas within the Guianas. In 2010 and 2012 Conservation International organized two rapid biodiversity assessments with the aim to establish the conservation value of the South of Suriname. We present here results of the botanical explorations carried out in several sites in the surroundings of Kwamalasamutu, Grensgebergte, and Kasikasima. We found 12 plant species mostly trees that were previously not recorded for Suriname. Several of these species have only recently been described. We also found a substantial amount of rare species that are only known from a few collections or are listed on the IUCN Red list. In terms of vegetation types the South has several floristic characteristics that are different from the North of Suriname, such as extensive forests on granite hills, and open rock vegetation. These results indicate the relatively unexplored status of the Guiana Shield basement complex of Suriname and its potential conservation value.

4.8. Harnessing business support for Floristics: opportunities and implications

William Milliken - Kew Royal Botanic Gardens, UK - w.milliken@kew.org

As industries address increasingly stringent biodiversity performance standards, both externally and self-imposed, the need for accurate baseline data becomes increasingly pressing. Within extractive industries, growing levels of commitment to achieving no net loss or net positive impact on biodiversity, including through the establishment of biodiversity offsets, demand a capacity to identify plant species and to assess conservation priorities efficiently. In areas where no Flora are available, private sector organisations find themselves commissioning costly research in areas outside their sphere of expertise in order to address these issues. Whilst this situation may present an increasingly valid business case for private sector support for Flora development, there are implications for the nature of the final product. Utilitarian rather than strictly scientific justifications for support require shorter-term returns and user-friendly products, whereby the best available data are constantly available to the end

users. Emerging technologies for electronic Flora make this possible, raising the question of whether traditional systems for producing and publishing Flora remain tenable in an age of reduced public-sector support for baseline biodiversity research.

4.9. Quick changes in nomenclature: the necessity to update floras and checklists

Christian Feuillet - Smithsonian Institution, USA - feuillec@si.edu

During the last 20 years, the number of molecular studies is increasing dramatically, causing numerous taxonomic changes. Examples from "Checklist of the plants of the Guiana Shield" and from "Flora of the Guianas" show that the problem is widely spread through the Angiosperms. The threat to the Flora and the Checklist shelf-life is obvious. Although it presents problems of work recognition, publication rights, the Flora's own format, and others, we should use more the Internet and e-publications possibilities to prolong their shelf-life.

4.10. EU FP-7 Pro-iBiosphere: an open biodiversity knowledge management system

Soraya Sierra - Naturalis Biodiversity Center, The Netherlands – soraya.sierra@naturalis.nl

Biodiversity core data and information constitutes an important source of knowledge for many disciplines. In order to facilitate access to this knowledge, technical and semantic interoperability barriers need to be addressed. The objectives of Pro-iBiosphere are to:

- Coordinate towards and prepare the foundations for a long-term viable, evolving knowledge management, aggregation and integration platform needed to replace and to improve the present system of taxonomic literature, especially as presented in Floras and Faunas;
- Identify, analyse and map EU-African joint ICT research priorities;
- Provide new methods to synthesize distributed knowledge and a strategy to adapt methods of acquisition, curation and dissemination of biodiversity data to the digital era;
- Help to align on-going and forthcoming semantic mark up of taxonomic literature, and to link elements of biodiversity literature (i.e. taxonomic treatments) to the original data, such as the individual observation record (being the essential foundation of any biodiversity information);

- Promote and monitor the development and adoption of common mark-up standards and specifications for making biodiversity knowledge more accessible and re-usable;
- Provide the community with technical solutions for the enhancement and use of these data;
- Analyse and evaluate business models for supporting Open Science and provide recommendations to achieve sustainable delivery of biodiversity information to target audiences;
- Develop and agree on a shared data and IPR policy;
- Promote and increase cooperation between the major biodiversity projects, initiatives and platforms at EU and global levels

These activities will prepare the ground for an integrative system for intelligent management of biodiversity knowledge.

4.11. Expanding reach through web and mobile apps

Alexander Krings - Herbarium (NCSC), Department of Plant Biology, North Carolina State University, USA – akrings@nscu.edu

Providing mobile access to taxonomic resources, through smart phones and tablets, can significantly enhance the reach and transfer of primary research effort, thus contributing to capacity building where access to primary literature is limited. A number of platforms and tools have been developed to increase the cyber-infrastructure for taxonomy. These have ranged broadly to include such various examples as digital multi-access keys (polyclaves), digital literature depositories, type digitization efforts, and scratchpads. However, few resources or tools have yet focused specifically on the mobile platform presented by smartphones and tablets. This is unfortunate as worldwide sales of mobile devices now outnumber sales of desktop and laptop computers combined. Developing floras and revisions for the mobile platform has a number of distinct advantages. Native taxonomic mobile apps can provide lightweight, yet authoritative, alternatives to field manuals and thus have the potential for increasing proficiency and accuracy in field identification. Our experience developing dual web and native apps at NCSC is discussed, with specific reference to taxonomic revisionary work.

4.12. How many tree species in the Guianas. Who is common and who is rare?

Hans ter Steege - Naturalis Biodiversity Center, The Netherlands – hans.tersteege@naturalis.nl

The Amazon, including the Guianas, is arguably the richest terrestrial biome of the earth. But how many species of trees are there? Even for a well researched sub-area such as the Guianas, we have no exact number. In this talk I will briefly discuss the collecting history of the Guianas. Then, making use of the largest plot data set of tree species composition in the complete Amazon, I will make an estimate of the number of tree species in the Guianas, discuss some of the common species, the differences with the rest of the Amazon and discuss how to deal with the species not yet collected.

5. ABSTRACTS OF POSTERS

5.1. *Norantea* s.str. (Marcgraviaceae) – Taxonomy and Biogeography

Stefan Dressler & V. Bumler - Senckenberg Research Institute, Germany - Stefan.Dressler@senckenberg.de

Norantea is a genus of lianas flowering in the canopy of neotropical rain forests. With their conspicuous racemose inflorescences including extrafloral nectaries the members attract many visitors and form a valuable food source in these ecosystems. Formerly comprising some 45 species (s.l.) the new classification of the family treats four morphological types as genera, *Norantea* (s.str.) being one of them with only 3 taxa. We give an overview about the taxa, their morphological characters, ecological traits, and distributional range. Furthermore, models of the possible distribution ranges using Maxent will be discussed. *Norantea guianensis* is a species of lowland rain forest mainly vicariantly distributed in two subspecies in NE South America, whereas *Norantea goyasensis* grows in somewhat higher altitudes on the Brazilian plateau in habitats with a more pronounced dry season. Outlyers in the distribution of *Norantea guianensis* were encountered west of the Andes and in Central America and the Caribbean.

Although these fit well in the predicted potential distribution their status (natural or man-made) remains to be checked.

5.2. The *Solanum* genus in French Guiana

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The Solanaceae family in the biogeographical area of the Guiana shield counts 119 taxa among which 67 are found in French Guiana (Funk *et al.*, 2007). Since the inclusion of *Cyphomandra* (Bohs, 1995) and *Lycopersicon* (Peralta & Spooner, 2000) into *Solanum*, this last one counts 43 species in French Guiana. In 2005, a list of species was prepared based on the basis of the data stemming from the databases Aublet2, Tropicos (Missouri Botanical Garden), Sonnerat (National Natural History Museum of France) and within the framework of the update of protected species. This list was used for weighting diverse ecological characters relative to endemism, the sensibility of species and their habitat. The used criteria arise from works of Schmeller *et al*. (2008) as well as those of Bordenave and Tostain 1997 synthesized in the recent publication Bordenave *et al*. (2012). It emerges from it that *Solanum paraensis* Ducke, *S. costatum* Nee and *S. leucopogon* Huber represent an interest from the point of view of conservation biology in French Guiana.

5.3. The family Capparaceae in the Guianas

Xavier Cornejo - Herbarium GUAY, Empresa Pública de Parques Naturales y Espacios Públicos, Ecuador - xcornejoguay@gmail.com

Capparaceae is a family of shrubs, trees, and sometimes lianas, covered with a pubescence of simple to variously stellate hairs, otherwise glabrous; the leaves are alternate or spiral, simple or 3-foliolate (only in *Crateva*), with entire margins; the inflorescences are terminal and/or lateral, usually racemose, paniculate or corymbose, bearing pecicellate flowers with exserted numerous stamens, and a single ovary supported by an elongate and exserted gynophore. The fruits are capsular, pepos or amphisarca (without replum), containing various to many seeds surrounded or embedded in a pulp, the seeds are often covered with a sarcotesta of infiltrated hairs or aril, the embryo is convolute. Capparaceae is distributed

throughout the tropical and subtropical belt in the Old and New World. This family in the Neotropics comprises 110 species that range from southern North America (Texas and Florida) to northern Argentina and the West Indies (Cornejo and Iltis, 2009). So far, 10 species are recorded in the Guianas, those are frequently scattered elements, inhabiting the lowlands of primary and secondary habitats in moist and wet forests, mostly on well drained soils. Regarding the geographic pattern of distribution, five species are widespread throughout the Neotropics, four are restricted to northern and Northeastern South America, and one (*Neocalyptrocalyx morii*) is known as an endemic to Central French Guiana. Capparaceae has been included in Brassicaceae s.l. (APG, 1998). Subsequent molecular studies (Hall et al., 2002, 2008) strongly support that Capparaceae s.s. must be considered a separate family, as currently accepted in APG III system.

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APPENDIX I. ONGOING FLORAS AND MODERN CLASSIFICATIONS:

HOW SHOULD WE ORGANIZE OUR FAMILIES?

By Piero Delprete – IRD, Herbier de Guyane (CAY), Cayenne, French Guiana (France)

Short story of modern and contemporary Angiosperm classifications

In order to provide an overview of the evolution of Angiosperm classification, I will first summarize the classifications that have been proposed starting from the late 1800s to the present, with a few comments and comparisons. In the second part of the presentation, I will briefly discuss the influence of classifications on floristic treatments, botany textbooks, and common usage, as well as the impact of the APG classification on ongoing floristic treatments. Angiosperm classifications from the end of the 19th century to the end of the 20th century were based upon the analysis of characters to produce an intuitive hypothesis of the relationships among taxa, mostly using a phenetic approach. Most of these classifications were proposed by a single or a few individuals with great capacity of synthesis of the data available at the moment, to produce an evolutionary hypothesis of natural groups within flowering plants. Although a rudimentary concept of natural groups was already proposed by Antoine Laurent de Jussieu (1789), the first “evolutionary” classification is that of Bentham and Hooker (1862--1883). The latter was a derivation of Candolle’s (1824--1873) classification, with important modifications influenced by the theory of evolution of their friend and colleague Charles Darwin (1859); and the classifications that followed were re-elaborations of previously proposed classifications. The classifications that have been most commonly used in floristic treatments and textbooks from the end of the 19th century to nowadays are summarized below.

Bentham & Hooker’s Classification. Genera plantarum (1862--1883). Bentham and Hooker recognized 202 families of flowering plants arranged in the following main groups:

Dicotyledonum polypetalarum
Dicotiledones gamopetalae
Dicotiledones monoclamidae

Gymnospemae
Monocotyledones

Engler & Prantl's Classification. Die Natürlichen Pflanzenfamilien (1887--1915). This classification was used for the organization of *Flora Brasiliensis*, which was contemporary with Engler & Prantl's publication. In this system, the flowering plants are organized as follows:

XIII. Divisio Embryophyta siphonogamia
Subdivisio Gymnospermae
Subdivisio Angiospermae
Class Monocotyledoneae (11 orders, 45 families)
Class Dicotyledoneae
Subclass Archiclamydeae (Piperales, Myricales, Balanopsidales, Fagales, Proteales, Polygonales, Rosales, Malvales, Myrtiflorae, etc) (33 orders, 206 families)
Subclass Metaclamydeae or Sympetalae (Ericales, Ebenales, Contortae, Tubiflorae, Rubiales, Cucurbitales, Campanulatae, etc.) (11 orders, 52 families)

Engler's Syllabus der Pflanzenfamilien, ed. 12 (Melchior & Werdermann, 1954–1964). This classification was followed for several floristic treatments, including the ongoing *Flora of Ecuador*. The classification proposed in the *Syllabus* is very similar to the one proposed by Engler & Prantl (1887--1915), shown above, and it is therefore not repeated here.

Cronquist's Classification - An Integrated System of Classification of Flowering Plants (1981) and **The Evolution and Classification of Flowering Plants (1969, 1988).** Cronquist's classification has been the main reference used in many floristic treatments, from the date of its publication until the beginning of the 21st century. Ongoing monographic series (e.g., *Flora Neotropica*), textbooks, and floristic treatments referred to this classification as the standard reference (e.g., Heywood, 1993; Mabberley, 1997; Smith, 2004). Cronquist divided the flowering plants into two classes, the Magnoliopsida (dicotyledons), with 64 orders and 321

families, and the Liliopsida (monocotyledons), with 19 orders and 65 families, which he placed in the following subclasses:

Class Magnoliopsida (DICOTS)

- Subclass Magnolidae (basal dicots; Magnoliales, Laurales, Piperales, etc.)
- Subclass Hamamelidae (Hamamelidales, Urticales, Fagales, etc.)
- Subclass Caryophyllidae (Caryophyllales, Polygonales, Plumbaginales)
- Subclass Dilleniidae (Dilleniales, Theales, Malvales, Violales, etc.)
- Subclass Rosidae (Rosales, Fabales, Proteales, Myrtales, Santalales, Celastrales, Euphorbiales, Polygalales, Sapindales, etc.)
- Subclass Asteridae (Gentianales, Solanales, Lamiales, Scrophulariales, Campanulales, Rubiales, Dipsacales, Asterales, etc.)

Class Liliopsida (MONOCOTS)

- Subclass Alismatidae (Alismatales, Hydrocharitales, Najadales, Triuridales)
- Subclass Arecidae (Arecales, Cyclanthales, Pandanales, Arales)
- Subclass Commelinidae (Commelinales, Eriocaulales, Juncales, Cyperales, etc.)
- Subclass Zingiberidae (Bromeliales, Zingiberales)
- Subclass Liliidae (Liliales, Orchidales)

Takhtajan's Classification - The Evolution and Classification of Flowering Plants (1969, 1997, 2009). Takhtajan, exchanged ideas and collaborated with Cronquist, and their systems of classification are quite similar, although Takhtajan preferred smaller orders and families. In the flowering plants, Takhtajan recognized the same classes recognized by his contemporaneous colleagues: Magnoliopsida (dicotyledons) and Liliopsida (monocotyledons). His system of classification evolved through the years, as more data accumulated and new analyses became available. For example, in 1997 his classification was based on the total evidence available in those days (morphology, embryology, phytochemistry, cytology, embryology, and palynology), and he proposed a system with 232 orders and 589 families (Takhtajan, 1997). His last classification (Takhtajan, 2009) continued to be based on total evidence available, and included the results from molecular phylogenies (although sometimes with contrasting conclusions), which changed his views on the groups he recognized. Therefore, this classification (Takhtajan, 2009) was a mixture of old and new elements, as he

interpreted the molecular phylogenies in a liberal way, and because he preferred to recognize smaller, easily distinguishable families, in contrast with the principles and classification proposed by the APG. As a result, he recognized 157 orders and 560 families, which are very high numbers as compared to those recognized by the APG III (2009; see below). In the Magnoliopsida (Dicots) Takhtajan (2009) included 8 subclasses, 126 orders, and about 440 families, and in the Liliopsida (Monocots) he included 4 subclasses, 31 orders, and 120 families. Below is a summary of his last classification.

Class Magnoliopsida (DICOTS)

- Dicotyledonous family of uncertain position: Haptanthaceae
- Subclass Magnoliidae (basal dicots)
- Subclass Ranunculidae
- Subclass Hamamelidae
- Subclass Caryophyllidae
- Subclass Dillenidae
- Subclass Rosidae
- Subclass Asteridae
- Subclass Lamiidae

Class Liliopsida (MONOCOTS)

- Subclass Alismatidae
- Subclass Liliidae
- Subclass Arecidae
- Subclass Commelinidae

The advent of molecular phylogenies and the Angiosperm Phylogeny Group (APG)

Until the end of the 20th century, classifications were constructed using the analysis of "ancestral" and "derived" characters, which supposedly indicated the evolutionary patterns of "primitive" and "advanced" families. During the last decades of the 20th century, two new methods revolutionized the data used and the way they are analyzed: molecular biology and cladistic analyses. Initially, the first cladistic analyses were made using morphological, anatomical and palynological data, and later almost exclusively DNA sequences. At first,

phylogenetic analyses included only one or two molecular markers, and at the beginning of the 21st century it became common to use several (nuclear and plastid) markers or genomic data. In order to produce a general phylogeny of all flowering plants, at the end of the 1990s the Angiosperm Phylogeny Group (APG) was formed. The APG is a group of systematists with the main goal of establishing a consensus on the classification of flowering plants, based primarily on molecular phylogenies.

Principles of the APG Classification - The basic principles of the APG approach were clarified in their first paper (APG, 1998):

1) The family is central in flowering plant systematics. ("An ordinal classification of families is proposed as a reference tool of broad utility". Orders are considered to have a significant value in teaching and in studying family relationships).

2) Groups should be monophyletic (descendants with a common ancestor). Previous classifications are rejected because the groups recognized were not tested with a phylogenetic study.

3) A broad approach to delimit orders and families. A smaller number of larger orders is considered to be more useful. Families containing only a single genus and orders of a single family are avoided, when possible.

APG (1998) – Starting from this publication, the APG (1998) treated previous classifications as outdated, and rejected them because the groups recognized had not been tested for monophyly. In this publication, 40 orders were recognized, which was a much reduced number when compared with the 83 orders recognized by Cronquist (1981), and the 232 proposed by Takhtajan (1997). In the first APG (1998) phylogeny, clades above the order level were given informal names (e.g., commelinoids, eurosids, euasterids). The most revolutionary result was that flowering plants were no longer divided into two formal groups. Results indicated that the monocots are sister to basal dicots, and the derived eudicots are a sister group to the clade with basal dicots and monocots. However, this classification was still far from complete and not yet stable, because approximately 25 families could not be readily assigned to a precise location in the phylogenies, and their position remained uncertain in the first APG classification.

APG II (2003) - The second APG publication (2003) was an update to the first publication, and proposed changes and additions to the initial phylogeny when supported by "substantial evidence." The principles established in the first paper were followed. The APG II preferred large groups, and placed most families with just one genus into their sister family. This was contrary to the opinion of many specialists, who generally prefer to maintain monospecific families as distinct. The APG II recognized 45 orders and from 402 to 457 families, because they treated 55 families as "optional segregates." Novel results included: 1) *Amborella* (Amborellaceae) was found as the sister taxon to the remainder of the angiosperms (a result known from previous studies), 2) new orders were proposed, to accommodate the basal angiosperms, 3) many previously unplaced families were assigned to certain positions, 4) several families were reorganized, because some traditional families were divided into smaller families, and others were united into a single large family. Also, within certain widely delimited families, a number of families were listed in square brackets as "acceptable, monophyletic alternatives to the broader circumscription" chosen by the APG II. A few years later, Haston et al. (2007) proposed a linear arrangement of the families recognized in the APG II paper.

APG III (2009) - The most recent classification proposed by the APG (APG III, 2009) confirmed the general backbone of the phylogeny proposed in their previous publications. This classification also positioned several previously unplaced families and genera by broadening the delimitation of certain new families and orders, and by adding several orders to the classification presented by APG II. Because of this, the number of orders was increased from 45 (APG II) to 59 (APG III). Only 10 families were not yet placed into any order, although they were placed at a certain position in the phylogenetic tree and the linear series. Only the Apodanthaceae and the Cynomoriaceae (both holoparasitic) were left out of the classification, mostly due to difficulty to extract complete sequences to be used in molecular phylogenies. The APG III authors stated that they "hope the classification [...] will not need much further change." The number of families changed from 402--457 (APG II, accounting for optional segregates) to a more stable 415 (APG III, as they opted to include many small families into larger ones). Along with the APG III classification, Chase & Reveal (2009) published a phylogenetic classification of land plants, and Haston et al. (2009) produced a linear sequence of the families, all arranged according to formal ranks. This linear sequence is very useful for the organization of families in herbaria and for the publication of floristic treatments. In addition,

the Angiosperm Phylogeny Website (http://www.mobot.org/MOBOT/research/APweb/), which is continuously updated by Peter Stevens (MO), is a very useful resource the phylogeny and classification of orders and families of flowering plants, and could serve as a basis for arranging floristic treatments and herbaria according to the APG III.

Conclusion about the current APG System: The APG has gradually produced a stronger and more stable system of angiosperm classification. The general backbone of the phylogeny has remained relatively stable and is not likely to change and family delimitations in the APG III are also quite stable. The exception is represented by the 10 small families that are still not placed in any order in the APG III, although they are placed at a certain position in the phylogenetic tree, in the linear series proposed, and on the tree of the Angiosperm Phylogeny Website. Only the Apodanthaceae and Cynomoriaceae (both holoparasitic families) are left outside the classification, and probably will continue to remain dubious, due to the difficulty of interpreting their extremely reduced morphological features, and to obtain usable molecular sequences. In conclusion, it is generally agreed that the APG III has reached a certain stability, and that it can be used as reference system for a long time. In addition, all the necessary references are available for family classification, and a very useful linear system exists for herbarium organization, floristic treatments, checklists, and ongoing long-standing floras.

End-users of APG classifications

Starting from its first publication onwards, the APG phylogenies and classifications became gradually more stable and were broadly accepted. Various plant systematics textbooks (Judd et al., 1999, 2002, 2007; Maas & Westra, 2005; Simpson, 2006, 2010; Souza & Lorenzi, 2005, 2008, 2012) and floristic publications (see below) have been using the APG classifications. Recently, the last edition of the famous “Plant Book” (Mabberley, 2008) followed the APG II classification. The last edition of the well-known “Flowering Plant Families of the World” (Heywood et al., 2009) abandoned Cronquist’s classification and was completely re-organized, in order to follow the APG classification, although in a liberal way. In fact, Heywood et al. (2009) recognized 506 families [in contrast to the 457 families of the APG II (2003), 415 families of the APG III (2009), and 560 families of Takhtajan (2009)]. Heywood et al. (2009)

preferred to recognize small families (in contrast to the APG philosophy), with family delimitations much more similar to those proposed by Takhtajan (2009).

A number of recent country and worldwide checklists have been arranged according to the APG III classification. Some important examples are the World Checklist of Selected Plant Families (http://apps.kew.org/wcsp/home.do), and the checklists of Brazil (Forzza et al., 2010; http://floradobrasil.jbrj.gov.br/2012/) and Colombia (Bernal et al., to be published in 2014).

To my knowledge, in 2004 the Utrecht Herbarium (U, now L) was the first herbarium that was re-organized according to the APG system. A significant number of major herbaria, including those of Kew (K) and Paris (P) are currently changing the order and delimitation of the families in their collections according to the APG III classification.

Ongoing floristic series in the Neotropics

Long-ongoing floristic treatments, with volumes published at irregular intervals, usually take a long time to be accomplished. For this reason, there is a tendency to maintain the family classification chosen at the beginning of the project, despite it slowly becomes obsolete. In the Neotropics, several floristic treatments were initiated in the 1900s, which adopted different strategies in terms of family classification used. In Central America, multi-volume series, such as *Flora Mesoamericana* and the *Manual de Plantas de Costa Rica*, were begun in the late 1900s using Cronquist's classification; however, during the last few years contributors have been gradually switching to the APG system (B. Hammell, pers. comm.). In South America, several country floras were initiated in the 1900s, but some of them are no longer actively pursued (*Flora de Venezuela*, *Flora of Peru*, *Flora de Colombia*?). To my knowledge, the only ongoing floristic series of South American countries are *Flora of Ecuador*, *Flora del Paraguay*, and *Flora of the Guianas*. The first volume of the *Flora of Ecuador* was published in 1973, and, since the beginning, the family arrangement was according to *Engler's Syllabus der Pflanzenfamilien*, ed. 12 (Melchior & Werdermann, 1954--1964). This classification has been followed up to the most recent volumes (C. Persson, pers. comm.); the last two volumes, published in 2010 and 2011, was a two-part treatment of the Orchidaceae, which is a family that has remained delimited exactly the same throughout all modern classifications (although its internal classification has been dramatically revolutionized by recent molecular phylogenies). The *Flora del Paraguay* (http://www.ville-ge.ch/cjb/fdp/project/project_frame.html

) was started in 1983, and since the beginning the families were also organized according to the *Syllabus* [Melchior & Werdermann, 1954--1964; although in the website this reference is cited as “Engler & Melchior (1964)”], but the genera have been defined according to the *Index Nominum Genericorum* (Farr et al., 1979).

Flora of the Guianas

The *Flora of the Guianas* was started in 1984, as an expansion of the *Flora of Suriname*. The classification adopted for this floristic series was that of Cronquist (1981), which came out just three years before. The first volume was published by Paul Maas (1985), and included plates in color and black & white as well as line drawings. This volume included the families Musaceae (incl. Streliziaceae, Heliconiaceae), Zingiberaceae (incl. Costaceae), and Cannaceae (order Zingiberales according to Cronquist’s classification, but the Marantaceae also need to be added to this order if the APG III is adopted).

As of today, 27 years after its first publication, about 67 of a total 207 Angiosperm families, following Cronquist’s classification, have been published in this series, and a few families are currently under revision. If the Angiosperm families were instead arranged according to the APG III classification, 67 of a total 215 families, i.e. about one third, have already been published. In fact, if the families were arranged according to the APG III, the total number of families in *FOG* will increase, and the number of treated families will remain the same. If it took 27 years to publish one third of the families, optimistically it will take at least another 60 years to complete the floristic treatment. There is still a lot of work to do, but, adopting the APG III classification, which is a relatively stable system, will stimulate contributors and will hopefully streamline the publication process of the *Flora of the Guianas* **(**http://www.nationaalherbarium.nl/FoGWebsite/index.htm**).**

Advantages of changing the classification for the Flora of the Guianas (FOG)

There are several advantages to switching from Cronquist’s to the APG III classification for FOG:

1) The families will be arranged and delimited according to a natural classification based on strongly supported monophyletic groups.

2) The current floristic series will probably be the only chance to publish this treatment for a long time to come; switching to the APG III system provides a classification that will be used in the future and that will continue to be at pace with modern treatments.

3) By choosing the most stable and modern classification system, FOG will also become a teaching tool. It could facilitate learning the contemporary delimitation of families by the general public.

4) The new classification will stimulate the publication of new treatments, because several APG III families are smaller, as they were segregated from larger families. These smaller families are easier to treat, due to a more manageable number of species.

5) When comparing the Cronquist and APG III classifications, it is actually amazing that just a few changes are needed to switch from one system to the other. In fact, the deductive classifications produced by Cronquist and Takhtajan are quite similar to those resulting from molecular phylogenies. The major difference is that dicots are paraphyletic with monocots as sister to one portion called the "basal dicots."

6) According to the extrapolation made above, it may take 60 more years to complete the FOG treatment. For it to be still valid in the future, it is important for FOG to switch to the APG III as soon as possible, so future publications will follow the modern system of classification.

How to change a floristic series that started from Cronquist to the APG System?

What I am proposing in this presentation is:

1) To publish a table that compares the classification and delimitation of the families according to the Cronquist and to the APG III systems (see Table 1).

2) To publish a volume, or an explanatory chapter, explaining the transition from Cronquist's to the APG III system.

3) To publish a key to the families that occur in the Guianas in the same volume, or in another volume, where the changes become effective in accordance with the APG III classification. This will facilitate the identification of families in this region.

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Table 1. Table of Orders and Families of the Flora of the Guianas arranged according APG III (2009), compared with Cronquist (1981) delimitation and classification, and indicating the publication dates of the families already published. This table was constructed by following the linear system of families published by Haston et al. (2009) and comparing it with the families present in the Guianas according to the FOG planning of October 2011, available in the internet at: http://www.nationaalherbarium.nl/FoGWebsite/index.htm

Families in bold are published.

APG III nr. in FOG	**Orders and Families according to APG III**	**Families according to Cronquist (1981) (numbers of FOG planning)**	Orders according to Cronquist (1981)	**Publi-cation year**
	NYMPHAEALES			
001	Cabombaceae	013 Cabombaceae	NYMPHAEALES	
002	Nymphaeaceae	012 Nymphaeaceae	NYMPHAEALES	
	CHLORANTHALES			
003	**Chloranthaceae**	**008 Chloranthaceae**	PIPERALES	**2007**
	CANELLALES			
004	Canellaceae	004 Canellaceae	MAGNOLIALES	
005	Winteraceae	001 Winteraceae	MAGNOLIALES	
	PIPERALES			
006	**Piperaceae**	**009 Piperaceae**	PIPERALES	**2007**
007	**Aristolochiaceae**	**010 Aristolochiaceae**	ARISTOLOCHIALES	**1998**
	MAGNOLIALES			
008	Myristicaceae	003 Myristicaceae	MAGNOLIALES	
009	Magnoliaceae	(not listed) Magnoliaceae	MAGNOLIALES	
010	Annonaceae	002 Annonaceae	MAGNOLIALES	
	LAURALES			
011	Siparunaceae	005 Monimiaceae s.l.	LAURALES	
012	**Hernandiaceae**	**007 Hernandiaceae**	LAURALES	**2007**
013	Monimiaceae	005 Monimiaceae s.l.	LAURALES	
014	Lauraceae	006 Lauraceae	LAURALES	

	ALISMATALES			
015	Araceae	178 Araceae	ARALES	
		179 Lemnaceae	ARALES	
016	**Alismataceae (incl. Limnocharitaceae)**	167 Limnocharitaceae	ALISMATALES	
		168 Alismataceae	ALISMATALES	
017	Hydrocharitaceae (incl. Najadaceae)	169 Hydrocharitaceae	HYDROCHARITALES	
		173 Najadaceae	NAJADALES	
018	Juncaginaceae	170 Juncaginaceae	NAJADALES	
019	Potamogetonaceae	171 Potamogetonaceae	NAJADALES	
020	Ruppiaceae	172 Ruppiaceae	NAJADALES	
	DIOSCORALES			
021	Taccaceae	203 Taccaceae	ORCHIDALES	
022	**Thismiaceae**	**206 Burmanniaceae**	ORCHIDALES	**1989**
023	**Burmanniaceae**			
024	Dioscoreaceae	205 Dioscoreaceae	LILIALES	
	PANDANALES			
025	**Triuridaceae**	**174 Triuridaceae**	TRIURIDALES	**1989**
026	Velloziaceae	201 Velloziaceae	LILIALES	
027	Cyclanthaceae	176 Cyclanthaceae	ARECALES	
028	Pandanaceae	177 Pandanaceae	PANDANALES	
	LILIALES			
029	Alstroemeriaceae	199 Liliaceae s.l.	LILIALES	
030	Smilacaceae	204 Smilacaceae	LILIALES	
031	Liliaceae	199 Liliaceae s.l.	LILIALES	
	ASPARAGALES			
032	Orchidaceae	207 Orchidaceae	ORCHIDALES	
033	Hypoxidaceae	199 Liliaceae s.l.	LILIALES	
034	Iridaceae	200 Iridaceae	LILIALES	
035	Amarillidaceae	199 Liliaceae s.l.	LILIALES	
036	Asparagaceae (incl. Agavaceae)	202 Agavaceae	LILIALES	
037	Arecaceae/Palmae	175 Arecaceae	ARECALES	
	COMMELINALES			
038	Commelinaceae	180 Commelinaceae	COMMELINALES	

039	**Pontederiaceae**	**197 Pontederiaceae**	LILIALES	**1994**
040	**Haemodoraceae**	**198 Haemodoraceae**	LILIALES	**1994**
	ZINGIBERALES			
041	**Streliziaceae**	**190 Streliziaceae**	ZINGIBERALES	**1985**
042	**Heliconiaceae**	**191 Heliconiaceae**	ZINGIBERALES	**1985**
043	**Musaceae**	**192 Musaceae**	ZINGIBERALES	**1985**
044	**Cannaceae**	**195 Cannaceae**	ZINGIBERALES	**1985**
045	Marantaceae	196 Marantaceae	ZINGIBERALES	
046	**Costaceae**	**194 Costaceae**	ZINGIBERALES	**1985**
047	**Zingiberaceae**	**193 Zingiberaceae**	ZINGIBERALES	**1985**
	POALES			
048	Typhaceae	188 Typhaceae	TYPHACEAE	
049	**Bromeliaceae**	**189 Bromeliaceae**	BROMELIALES	**p.p. 1987**
050	Rapateaceae	181 Rapateaceae	COMMELINALES	
051	**Xyridaceae**	**182 Xyridaceae**	COMMELINALES	**1994**
052	Eriocaulaceae	184 Eriocaulaceae	ERIOCAULALES	
053	Mayacaceae	183 Mayacaceae	COMMELINALES	
054	Thurniaceae	185 Thurniaceae	JUNCALES	
055	Cyperaceae	186 Cyperaceae	CYPERALES	
056	**Poaceae**	**187 Poaceae**	CYPERALES	**1990**
	CERATOPHYLLALES			
057	Ceratophyllaceae	014 Ceratophyllaceae	NYMPHEALES	
	RANUNCULALES			
058	Papaveraceae	019 Papaveraceae	PAPAVERALES	
059	Menispermaceae	017 Menispermaceae	RANUNCULALES	
060	Ranunculaceae	015 Ranunculaceae	RANUNCULALES	
	PROTEALES			
061	Sabiaceae	018 Sabiaceae	RANUNCULALES	
062	Nelumbonaceae	011 Nelumbonaceae	NYMPHAEALES	
063	**Proteaceae**	**090 Proteaceae**	PROTEALES	**2009**
	BUXALES			
064	Buxaceae	115a Buxaceae	EUPHORBIALES	

	DILLENIALES			
065	Dilleniaceae	040 Dilleniaceae	DILLENIALES	
	SAXIFRAGALES			
066	Peridiscaceae	058 Peridiscaceae	VIOLALES	
067	Crassulaceae	083 Crassulaceae	ROSALES	
068	Haloragaceae	092 Haloragaceae	HALORAGALES	
	VITALES			
069	Vitaceae	117 Vitaceae	RHAMNALES	
	ZYGOPHYLLALES			
070	**Krameriaceae**	**126 Krameriaceae**	POLYGALALES	**1998**
071	Zygophyllaceae	133 Zygophyllaceae	SAPINDALES	
	FABALES			
072	**Fabaceae/ Leguminosae**	**087 Mimosoideae**	FABALES	**2011**
		088 Caesalpiniaceae p.p.	FABALES	**1989**
		089 Fabaceae	FABALES	
073	Surianaceae	086a Surianaceae	ROSALES	
074	Polygalaceae	125 Polygalaceae	POLYGALALES	
	ROSALES			
075	Rosaceae	084 Rosaceae	ROSALES	
076	Rhamnaceae	116 Rhamnaceae	RHAMNALES	
077	**Cannabaceae**	**020 Ulmaceae**	URTICALES	**1992**
078	**Ulmaceae**			
079	**Moraceae**	**021 Moraceae**	URTICALES	**1992**
080	**Urticaceae (incl. Cecropiaceae)**	**022 Cecropiaceae**	URTICALES	**1992**
		023 Urticaceae	URTICALES	**1992**
	FAGALES			
081	Myricaceae	025 Myricaceae	MYRICALES	
082	**Casuarinaceae**	**026 Casuarinaceae**	CASUARINALES	**1992**
	CUCURBITALES			
083	Apodanthaceae	108 Rafflesiaceae	RAFFLESIALES	
084	Anisophylleaceae	082 Anisophylleaceae	ROSALES	

085	Cucurbitaceae	064 Cucurbitaceae	VIOLALES	
086	Begoniaceae	065 Begoniaceae	VIOLALES	
	CELASTRALES			
087	Lepidobotryaceae (*Ruptiliocarpon* sp.)	134a Lepidobotryaceae	GERANIALES	
088	Celastraceae (incl. **Hippocrateaceae**)	109 Celastraceae	CELASTRALES	
		110 Hippocrateaceae	CELASTRALES	**1994**
	OXALIDALES			
089	Connaraceae	081 Connaraceae	ROSALES	
090	Oxalidaceae	134 Oxalidaceae	GERANIALES	
091	Cunoniaceae	081a Cunoniaceae	ROSALES	
092	Elaeocarpaceae	048 Elaeocarpaceae	MALVALES	
	MALPIGHIALES			
094	Rhizophoraceae	101 Rhizophoraceae	RHIZOPHORALES	
095	Erythroxylaceae	118 Erythroxylaceae	LINALES	
096	Peraceae	115 Euphorbiaceae s.l.	EUPHORBIALES	
097	Euphorbiaceae	115 Euphorbiaceae s.l.	EUPHORBIALES	
098	Ochnaceae (incl. Quiinaceae)	041 Ochnaceae	THEALES	
		045 Quiinaceae	THEALES	
099	Phyllanthaceae	115 Euphorbiaceae s.l.	EUPHORBIALES	
100	Malpighiaceae	122 Malpighiaceae	POLYGALALES	
101	**Trigoniaceae**	**124 Trigoniaceae**	POLYGALALES	**1998**
102	**Dichapetalaceae**	**113 Dichapetalaceae**	CELASTRALES	**2009**
103	**Euphroniaceae**	**123a Euphroniaceae**	POLYGALALES	**1998**
104	**Chrysobalanaceae**	**085 Chrysobalanaceae**	ROSALES	**1986**
105	Putranjivaceae	115 Euphorbiaceae s.l.	EUPHORBIALES	
106	Passifloraceae (incl. Turneraceae)	061 Turneraceae	VIOLALES	
		062 Passifloraceae	VIOLALES	
107	Lacistemataceae	057 Lacistemataceae	VIOLALES	
108	Salicaceae (incl. Flacourtiaceae)	056 Flacourtiaceae p.p.	VIOLALES	
109	Violaceae	060 Violaceae	VIOLALES	
110	Goupiaceae	109 Celastraceae p.p.	CELASTRALES	
111	Achariaceae	056 Flacourtiaceae p.p.	VIOLALES	
112	Caryocaraceae	042 Caryocaraceae	THEALES	
113	Humiriaceae	119 Humiriaceae	LINALES	

114	Linaceae (incl.Hugoniaceae)	121 Hugoniaceae	LINALES	
115	Ixonanthaceae	120 Ixonanthaceae	LINALES	
116	Calophyllaceae	047 Clusiaceae (incl. Hypericaceae)	THEALES	
117	Clusiaceae			
118	Bonnetiaceae	043 Theaceae p.p. (incl. Bonnetiaceae)	THEALES	
119	Podostemaceae	091 Podostemaceae	PODOSTEMALES	
120	Hypericaceae	047 Clusiaceae (incl. Hypericaceae)	THEALES	
	MYRTALES			
121	**Combretaceae**	**100 Combretaceae**	MYRTALES	**2009**
122	Lythraceae (incl. Punicaceae)	094 Lythraceae	MYRTALES	
		097 Punicaceae		
123	**Onagraceae**	**098 Onagraceae**	MYRTALES	**1991**
124	**Vochysiaceae**	**123 Vochysiaceae**	POLYGALALES	**1998**
125	Myrtaceae	096 Myrtaceae	MYRTALES	
126	**Melastomataceae**	**099 Melastomataceae**	MYRTALES	**1993**
	PICRAMNIALES			
127	Picramniaceae	130 Simaroubaceae (incl. Picramniaceae) p.p.	SAPINDALES	
	SAPINDALES			
128	Burseraceae	128 Burseraceae	SAPINDALES	
129	**Anacardiaceae**	**129 Anacardiaceae**	SAPINDALES	**1997**
130	**Sapindaceae**	**127 Sapindaceae**	SAPINDALES	**2012**
131	Rutaceae	132 Rutaceae	SAPINDALES	
132	Simaroubaceae	130 Simaroubaceae p.p.	SAPINDALES	
133	Meliaceae	131 Meliaceae	SAPINDALES	
	MALVALES			
134	Malvaceae s.l. (inc. Tilliaceae, Sterculiaceae, Bombacaceae)	**049 Tiliaceae**	MALVALES	**1995**
		050 Sterculiaceae (incl. Byttneriaceae)	MALVALES	
		051 Bombacaceae	MALVALES	
		052 Malvaceae	MALVALES	
135	Thymelaeaceae (incl. Tepuianthaceae)	095 Thymelaeaceae	MYRTALES	
		114 Tepuianthaceae	CELASTRALES	

136	Bixaceae	059 Bixaceae (incl. Cochlospermaceae)	VIOLALES	
137	**Dipterocarpaceae (incl. Monotaceae)**	**041a Dipterocarpaceae**	THEALES	**1995**
	BRASSICALES			
138	Moringaceae	069 Moringaceae	CAPPARALES	
139	Caricaceae	063 Caricaceae	VIOLALES	
140	Bataceae	070 Bataceae	BATALES	
141	Capparaceae	067 Capparaceae	CAPPARALES	
142	Cleomaceae			
143	Brassicaceae/Cruciferae	068 Brassicaceae	CAPPARALES	
	SANTALALES			
144	**Balanophoraceae**	**107 Balanophoraceae**	SANTALALES	**1993**
145	**Olacaceae**	**102 Olacaceae (incl. Schoepfiaceae)**	SANTALALES	**1993**
146	**Schoepfiaceae**			
147	**Opiliaceae**	**103 Opiliaceae**	SANTALALES	**1993**
148	Santalaceae (incl. **Eremolepidaceae**, **Viscaceae**)	104 Santalaceae	SANTALALES	
		105a Eremolepidaceae	SANTALALES	**2007**
		106 Viscaceae	SANTALALES	**2007**
149	**Loranthaceae**	**105 Loranthaceae**	SANTALALES	**2007**
	CARYOPHYLLALES			
150	Plumbaginaceae	039 Plumbaginaceae	PLUMBAGINALES	
151	Polygonaceae	038 Polygonaceae	POLYGONALES	
152	**Droseraceae**	**055 Droseraceae**	NEPENTHALES	**2003**
153	**Rhabdodendraceae**	**086 Rhabdodendraceae**	ROSALES	**2009**
154	**Caryophyllaceae**	**037 Caryophyllaceae**	CARYOPHYLLALES	**2003**
155	**Amaranthaceae (incl. Chenopodiaceae)**	**032 Chenopodiaceae**	CARYOPHYLLALES	**2003**
156		**033 Amaranthaceae**	CARYOPHYLLALES	**2003**
157	**Aizoaceae**	**030 Aizoaceae**	CARYOPHYLLALES	**2003**
158	**Phytolaccaceae**	**027 Phytolaccaceae**	CARYOPHYLLALES	**2003**
159	**Nyctaginaceae**	**029 Nyctaginaceae**	CARYOPHYLLALES	**2003**
160	**Molluginaceae**	**036 Molluginaceae**	CARYOPHYLLALES	**2003**
161	**Basellaceae**	**035 Basellaceae**	CARYOPHYLLALES	**2003**
162	**Talinaceae**	**034 Portulacaceae**	CARYOPHYLLALES	**2003**
163	**Portulacaceae**			
164	**Cactaceae**	**031 Cactaceae**	CARYOPHYLLALES	**1997**

	ERICALES			
165	Balsaminaceae	Not in the list (probably escaped from cultivation)	GERANIALES	
166	Marcgraviaceae	044 Marcgraviaceae	THEALES	
167	**Lecythidaceae**	**053 Lecythidaceae**	LECYTHIDALES	**1992**
168	Sapotaceae	074 Sapotaceae	EBENALES	
169	Ebenaceae (incl. Lissocarpaceae)	075 Ebenaceae	EBENALES	
		077 Lissocarpaceae	EBENALES	
170 p.p.	Primulaceae (incl. **Theophrastaceae** and Myrsinaceae)	**079 Theophrastaceae**	PRIMULALES	**2009**
		080 Myrsinaceae	PRIMULALES	
171	Theaceae	043 Theaceae p.p. (incl. Bonnetiaceae)	THEALES	
172	Symplocaceae	078 Symplocaceae	EBENALES	
173	Styracaceae	076 Styracaceae	EBENALES	
174	**Sarraceniaceae**	**054 Sarraceniaceae**	NEPENTHALES	**2003**
175	Clethraceae	072 Clethraceae	ERICALES	
176	**Cyrillaceae**	**071 Cyrillaceae**	ERICALES	**2009**
177	Ericaceae	073 Ericaceae	ERICALES	
	Near GARRYALES			
178	**Icacinaceae**	**112 Icacinaceae**	CELASTRALES	**1994**
	GENTIANALES			
179	Rubiaceae	163 Rubiaceae	RUBIALES	
180	Gentianaceae	139 Gentianaceae	GENTIANALES	
181	Loganiaceae	138 Loganiaceae s.l. (including *Polypremum*)	GENTIANALES	
182	Apocynaceae s.l. (incl. Asclepiadaceae)	140 Apocynaceae	GENTIANALES	
		141 Asclepiadaceae	GENTIANALES	
	UNPLACED LAMIDS			
183	Boraginaceae	147 Boraginaceae	LAMIALES	
	SOLANALES			
184	Convolvulaceae	143 Convolvulaceae	SOLANALES	
		144 Cuscutaceae	SOLANALES	
185	Solanaceae	142 Solanaceae	SOLANALES	

186	Sphenocleaceae	161 Sphenocleaceae	CAMPANULALES	
	LAMIALES			
187	Hydroleaceae	146 Hydrophyllaceae	SOLANALES	
188	Oleaceae	152 Oleaceae	SCROPHULARIALES	
189	Tetrachondraceae (*Polypremum*)	138 Loganiaceae s.l. (including *Polypremum*)	GENTIANALES	
190	**Gesneriaceae**	**155 Gesneriaceae**	SCROPHULARIALES	**2008**
191	Plantaginaceae (incl. Callitricaceae, and Scrophulariaceae p.p.)	150 Callitrichaceae	CALLITRICALES	
		151 Plantaginaceae	PLANTAGINALES	
		153 Scrophulariaceae p.p.	SCROPHULARIALES	
192	Scrophulariaceae (incl. Myoporaceae)	153 Scrophulariaceae p.p. 154 Myoporaceae		
193	Linderniaceae			
194	Pedaliaceae (*Sesamum*)	157 Pedaliaceae (incl. Martyniaceae)	SCROPHULARIALES	
195	Lamiaceae/Labiatae	149 Lamiaceae	LAMIALES	
196	Orobanchaceae	153 Scrophulariaceae p.p.	SCROPHULARIALES	
197	Lentibulariaceae	160 Lentibulariaceae	SCROPHULARIALES	
198	**Acanthaceae (incl. Mendonciaceae)**	**156 Acanthaceae (Incl. Thunbergiaceae)**	SCROPHULARIALES	**2006**
		159 Mendonciaceae	SCROPHULARIALES	**2006**
199	Bignoniaceae	158 Bignoniaceae	SCROPHULARIALES	
201	Schlegeliaceae			
202	**Verbenaceae**	**Verbenaceae (incl. Avicenniaceae)**	LAMIALES	**1988**
203	Martyniaceae (*Craniolaria*)	157 Pedaliaceae (incl. Martyniaceae)	SCROPHULARIALES	
	AQUIFOLIALES			
204	Aquifoliaceae	111 Aquifoliaceae	CELASTRALES	
	ASTERALES			
205	Campanulaceae	162 Campanulaceae (incl. Lobeliaceae)	CAMPANULALES	
206	Menyanthaceae	145 Menyanthaceae	SOLANALES	
207	Asteraceae	166 Asteraceae	ASTERALES	
	DIPSACALES			

208	Adoxaceae (*Sambucus* and *Viburnum*)	164 Caprifoliaceae	DIPSACALES	
	APIALES			
209	Araliaceae	136 Araliaceae	APIALES	
210	Apiaceae/Umbelliferae	137 Apiaceae	APIALES	
	GYMNOSPERMS			
211	**Cycadaceae**	**208 Cycadaceae**		**1991**
212	**Zamiaceae**	**208a Zamiaceae**		**1991**
213	**Gnetaceae**	**209 Gnetaceae**		**1991**
214	**Pinaceae**	**210 Pinaceae**		**1991**
215	**Podocarpaceae**	**211 Podocarpaceae**		**1991**